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## CONTENTS.

An Asterisk (*) denotes an illustrated article.


OFFICIAL CIRCULAR—

Annual Meeting of the Western Gas Association..... 197

EDITORIALS—

Obituary—Mr. Thomas Butterworth..... 197

The Proposed Gas Commission for New York City..... 198

Fifteenth Annual Meeting of the New England Association of Gas Engineers—Official Report—Continued from page 174..... 199

An Experience with Naphthaline Deposits, by Edward C. Jones—Discussion—Naming Place Wherein to Hold Next Annual Meeting—Proposing to Limit the Term of Presidential Office—Taking Up the Question-Box—The Questions Discussed were, "What advances have been made in electric lighting during the past year?"—"What is the effect of atmospheric change upon the candle power of gas—especially a low barometrical pressure?"—"Is a pipe around the retort house, between the hydraulic and condenser, of any practical value?"—"What candle power coal gas can be maintained by enriching with naphtha introduced into a retort of the ordinary setting?"—"Which is the best method to use oil as an enricher, and the kind to be used?"

Papers Read before the First Annual Meeting of the Ohio Gas Light Association, with Discussions on Same—Official Report—Continued from page 177..... 203

Papers, by Messrs. E. McMillin and J. Light, on the subject of, The Prevention of Naphthaline as a Deposit in Gas Works Plant—Discussion—First Day, Afternoon Session—Natural Gas; what is It, and can It become a Competitor of Coal Gas as an Illuminating Agent? by I. Butterworth—Discussion.

The New Gasholders Built to the Order of "The Gas Light and Coke Company," at the Horseferry Road Station..... 207

Improvement of the Locomotive Engine..... 208

One or Two Figures..... 208

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 208

To Take Charge of the El Paso (Texas) Plant—Removing Hard Tar from Hydraulic, and Freeing Dip and Ascension Pipes—He Came to Grief—East End Gas Company (Pittsburgh, Pa.) Reduces Price of Gas—An Additional List of Victims—Case No. :—Case No. 3—American Water Works Association—A Few of the Consumers who Will Not Have the Chicago Water Gas—Thought It was a Job—"Incorporating" Themselves—Turning on the Gas—Obituary Note—A Change in Superintendency at Montgomery (Ala.) Works—Personal—Heating the Newly-Built "Insurance Exchange" and "Traders' Building, of Chicago, Ills., with Gas—The Audience Left in Darkness—Reducing Price of Gas at Utica, N. Y.—From Present Appearances, We Think "No" Answers the Conundrum—Rockland (Me.) Gas Light Company Reduces Price of Gas—He was Told to "Go on"—The Nassau Company's New Plant.

CORRESPONDENCE—

The "Knights of Labor" Speak Their Mind..... 210

The Market for Gas Securities..... 211


[OFFICIAL CIRCULAR.]

## ANNUAL MEETING WESTERN GAS ASSOCIATION.

SECRETARY'S OFFICE WESTERN GAS ASSOCIATION,
QUINCY, ILLS., March 20, 1885.

The Eighth Annual Meeting of the Western Gas Association will be held at Chicago, Ills., on the 13th, 14th and 15th days of May. The Committee of Arrangements, Messrs. E. L. Brown, P. T. Burtis, and Henry Pratt, have spared no pains to secure for our accommodation the best quarters for our purpose obtainable. Those who attended our last reunion at St. Louis will remember but too well that the chief, and perhaps the only, drawback to an entirely successful meeting was the character of the room in which were conducted the business sessions of our Association. Owing to our late unfortunate experience in this particular, you are all aware that it is a matter of the highest importance that the acoustic property of the hall in which we are to assemble should be as excellent as it is possible to secure. Bearing this point well in mind, the Committee, after having carefully examined the assembly rooms of every first class hotel in Chicago, arrived at the unanimous conclusion that the Tremont House, of that city, came nearer meeting our requirements, in all essential particulars, than any of the others, and accordingly have secured it for our Eighth Annual Meeting. This hotel, although not so large as some of the others, is strictly first-class in all its appointments, and admirably well adapted to our needs. Liberal concessions from the regular rates were secured by the Committee, and the prices to our members will range from $2.50 per day upwards, according to the size and location of rooms. Apartments can be secured, at any time before the date of the meeting, by those who will communicate with the proprietors of the hotel, or with your Secretary; but the members must in all cases give notice, in their requests, of the rates which they desire to pay.

I am very anxious to be informed as soon as possible of the titles of the papers to be presented, and earnestly request their authors to favor me with this information at their earliest convenience.

Copies of our Constitution and By-Laws, blank forms of application for membership, or any other information that may be desired, will be promptly furnished if you will but make your wants known to, Yours very truly,

A. W. LITTLETON, Secretary

## OBITUARY.—MR. THOMAS BUTTERWORTH.

Once more do we find ourselves called upon to chronicle the demise of one who had always been looked upon as a leader in the ranks of the gas fraternity of the United States; and most sincerely do we deplore the occasion that compels us to announce the decease of Mr. Thomas Butterworth, late of Rockford, Illinois. Mr. Butterworth's physical condition had not been of the most rugged sort during the last two or three years, and while on a visit to this city last October the gentleman acknowledged to us that in order to escape the importunities of his political friends, who were extremely anxious he should contest the Rockford district with a view to representing the people of that section in the next Federal Congress, he was obliged to come East at an earlier period than he would naturally have selected to be in attendance at the Twelfth Annual Meeting of the American Gas Light Association. He explained that his health had been so poor that he feared to incur the excitement and fatigue consequent upon a protracted political canvass. Indeed his caution was well founded, for the jolting and discomfor

inseparable from a railway journey between Rockford (Ills.) and New York city had so far ennervated him that he was completely prostrated upon his arrival at the Metropolis. During a ten days' sojourn at the Westminster Hotel he complained greatly; but the care and attention with which he was surrounded enabled him to recuperate to such a degree that his kindly face and genial presence brought pleasure to his brother members during the Association's 1884 Washington sessions.

Shortly after his return to Rockford the symptoms of his peculiar malady had made such ravages and vigorous progress that, acting under the urgent advice of his medical attendants, joined to the affectionate persistence of his wife and children, Mr. Butterworth determined to seek a milder climate than that of his home, and journeyed along by easy stages until the chosen spot (Asheville, North Carolina,) was reached. Accompanied on this Southern trip by his wife and two of his children, the afflicted gentleman, although ministered to by the careful attention of earnest, zealous hands, and solaced and upheld by the warmest and most tender affection, death's progress could at best be but delayed. Despite every art known to medical science, and every care that loving hearts could bestow upon the object of their affection, Mr. Butterworth succumbed to the scythe of the reaper on the morning of Sunday, April 5th. A note received at Rockford by one of deceased's friends, and from the pen of a witness at the death bed, says: "The end has come—months of weary, patient suffering reached their end in the solemn silence of death! Hoping against all hope; with not a ray of light amid the somber shadows hovering over his death-bed, the family and friends of Thomas Butterworth would not believe that the stern enemy had marked him for his own. At a time of life when the faithful body and tired mind might take relief from toil and care; when the prospect of a cheerful home, a comfortable living, a devoted family, and a freedom from the heavier burdens of life offered the brightest prospects, the happiest solace, for his declining years, it seemed more than hard that fate should be so pitiless. He had worked early and late—tireless, unceasing, undaunted, amid all the vexations and hindrances which would have borne a weaker spirit to the earth—his vigorous strife had but reached the hour of its richest earthly reward; yet such is the end. The mind rebels at the sad blow, and yet it cannot be thrust aside."

Mr. Butterworth was in all respects a self-made and a self-reliant man, as indeed the following briefly-stated chronologic recital will show. Born at Manchester, England, on the sixth day of September, 1827, the limited resources of his parents did not permit his attendance upon the studies of a day-school after his eleventh birthday anniversary had been attained. From thenceforward he had to rely upon his own resources, and face the stern necessity of making his way through life. He served a seven years' apprenticeship to an English firm of house builders, and at 18 years of age had mastered the bricklayer's craft. If he could not pursue a regular course of study during the daytime he had ambition enough to turn his evening hours of leisure to good account, and in this way he managed to secure a perfect insight into the principles underlying applied mechanics. He became united in marriage with his first wife when in his 19th year, and about a year afterwards the youthful couple embarked for America, taking passage in the sailing vessel *General Taylor*. After a voyage that lasted over six weeks the port of New Orleans, La., was reached; and on December 21st, 1848, the youthful emigrants stepped on ground that was fairly dotted with the newly-made graves of those who had yielded to the frightful yellow fever scourge of that year. In an old Bible in possession of the Butterworth family appears the following record in reference thereto: "Found the city almost deserted on account of the yellow fever raging—there being no frost until after Jan. 1st, 1849." Mr. Butterworth's means at the period were so limited that, in order to procure funds to land himself and wife at Cincinnati, Ohio, he was compelled to dispose of nearly all his personal effects—the sacrifice including his engineering and mechanical text-books. Arriving at Cincinnati, it was not long before he secured employment with Stacey and Company, which at that period was largely engaged in the construction of public buildings—such as churches, etc. It was while in the employ of this Cincinnati firm, afterwards so closely identified with the growth of the gas industry in the west, that Mr. Butterworth became an adept in the principles of gas manufacture and distribution, and furnishes an explanation as to how his skilful management placed the Rockford plant on such a firm footing. The Messrs. Stacey, in 1854, despatched Mr. Butterworth to make extensive repairs to the Rockford works, owned at the time by Lane, Sanford & Company. These gentlemen became so impressed with the methods employed that Mr. Butterworth was offered an interest in the plant, and asked to remain in the management of its future fortunes. With his family he decided to make Rockford his permanent home; and for a time the Butterworth homestead was located in some rooms at the rear of the gas works. His careful habits and unflagging industry were such that at his death, and for quite a while before, he was sole proprietor of the Rockford works. At one period he was largely interested in the Freeport (Ills.) works.

The deceased gentleman was a firm believer in the benefits to be derived from connection with gas engineering associations. The Rockford Company endorsed and became a subscriber to the rules governing what has since become known as the American Gas Light Association, but then designated by the title of "The Gas Light Association of the United States," on the occasion of the first annual meeting, held in New York city, October, 1873. The deceased gentleman was chosen a member of the American Association's Executive Committee at 1882 meeting; chosen third vice-president at 11th assembly; the Washington meeting, in 1884, beholding him elected to the chair of second vice-president. He became affiliated with the Western Gas Association at First Annual meeting, held at Tremont House, Chicago, Ills., May 14th, 1879, being at the time chosen as second vice-president of that body. He was elevated to the presidency of Western Gas Association at Indianapolis meeting, and held the occupancy of the Chair during two straight terms, or up to the full limit prescribed by the by-laws of the organization. He was a faithful attendant at the annual meetings of both associations, and ever ready to impart to his fellow members information regarding the gas maker's craft. No other man in the Western country excelled him in the possession of knowledge connected with our business, and the record of his operations at Rockford is pointed to in confirmation of the assertion.

Mr. Butterworth represented his district in the lower house of the Illinois State Legislature in the year 1878; was popular with his neighboring citizens, and his voice was ever uplifted in their behalf. It was through his efforts that the attempts of a certain unscrupulous ring of political tricksters to light the State House at Springfield, with a specially constructed gas works, were brought to grief. The features of the scheme were so cleverly brought to light, through Mr. Butterworth's investigations, that the concocters of the measure were covered with discredit.

Mr. Butterworth, after the death of his second wife (which occurred in the year 1862, we think), made a second matrimonial venture in 1866. This lady survives him, as also do seven children, three of whom are the surviving fruit of his first marriage. One of these became the wife of Mr. Paul F. Schuster, who has contributed much in later years toward relieving Mr. Butterworth's mind of many burdensome details connected with the management of the Rockford works. Deceased was one of Rockford's most generous citizens, and no public beneficence or private charity ever appealed to him in vain. His family relations were of the happiest, tenderest character. He was a good man, in the highest and truest sense of the term; and the memory of his straightforward career, and sturdy, honest application to the principles and practice of true benevolence, now robs his death of much of its poignancy. May his "sons their father's fading footsteps see," and may his intimates in our common business harken to the echoes of his counsel, and emulate his professional career.

The funeral services, attended with all Masonic honors (of which craft deceased was a prominent and valued member), took place from his former residence, No. 203 North Main street, Rockford, at 3 P.M. of Wednesday, April 8th.

## THE PROPOSED GAS COMMISSION FOR NEW YORK CITY.

The result of the "labor" indulged in by the gas reformers before and after the sessions of the Senate Investigating Committee, who did not discover any of those dreadfully heinous practices which common rumor has for years past attributed to those in charge of the gas supply of New York city, is the appearance before the New York legislators of about as neat a hybrid sort of measure as one could well imagine. The hybrid appears on the Senate calendar as "No. 315," its official baptismal title being, "An Act to establish the Board of Lighting Commissioners for the city of New York." On date of April 8th the Senate made the measure a "special order," and rushed the three readings through with racehorse speed. Only one amendment was made to the measure, and that was of the most trifling description. The vote by which it was passed was, yeas, 20; nay, 1. As it now goes to the consideration of the Assembly, we will wait for the action of the lower house before making any criticism of its features, further than asserting that it is an attempt at legislation which, if its merits were to be tested before a suitable judicial tribunal, would be at once thrown aside as unconstitutional. If the legislators of this State seriously desire that gas company and consumer be adequately protected, let them appoint a preliminary commission (and pay good salaries to commissioners, if the right men can only be secured in that way) whose duty it shall be to determine what that protection shall consist of. The principles underlying the matter are too complex to admit of their disposal in the summary fashion adopted by Sherwood, Thurber and their associates. It took years for the Englishmen to arrive at the present London standard; and we would respectfully submit that that plan is on the far side of perfection even now. And although Mr. Livesey (who should obtain the largest meed of credit for the shaping of the English statutes) is a gas man, we would like to back him at "odds on" for integrity and purity of purpose as against the most shining light of the associated New York conclave of professional gas reformers.

[Official Report—Continued from Page 174.]

## Fifteenth Annual Meeting of the New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Mass., Feb. 18 and 19, 1885.

### First Day—Afternoon Session—Feb. 18.

Upon conclusion of the discussion evoked by the topic presented by Mr. Prichard, Chairman Greenough announced that the Association was in readiness to hear the paper submitted by Mr. Edward C. Jones, of South Boston, Mass., on the subject of

### An Experience with Naphthaline Deposits.

Mr. Jones read as follows:

Our experience at South Boston with naphthaline has been large and varied, ranging from ordinary stoppages of service pipes to the closing up of a 14-inch outlet from a gasholder. Recognizing the value of naphtha, or benzine vapor, as a solvent and vehicle for taking up and carrying off naphthaline vapor, we have made a study of how best to mingle a small quantity of the naphtha with the gas.

Upon receiving a number of reports of poor light from any one locality, it has been the custom to put naphtha into the mains through the riser pipes of the street lamps, and this practice, for the time, remedied the trouble; but still the relief thus afforded was only local, and the difficulty would often appear in another portion of the district.

A 3-inch main, where it crosses a bridge, was a source of great vexation, at times becoming entirely filled with the naphthaline deposit; and again the outlet to the holder at the works became stopped, from time to time, at a point above the level of the water inside the tank—a difficult place to reach with steam or naphtha, and often for hours resisting the utmost efforts to clear it.

In September last we started a new and modern works at South Boston, equipped with large purifiers and connections; and among other happenings under the new order of affairs, my attention was called to the amount of gas lost by blowing out a purifier after it had been put into operation. This amounted to 624 feet every time we changed, and was caused evidently by the amount of gas required to displace the air in the third purifier. If the air is not blown out of the purifier box and connections, but is allowed to pass on into the holder, its presence will materially deteriorate the gas. I have known of instances where this air has organized in a body and marched boldly the entire length of the main street at lighting time, causing the lights to go down and burn with a blue flame, and then come slowly up in quick succession as it passed by. This is most apt to occur in small works, where the cubic contents of a purifier box is larger in proportion to the amount of gas on hand than in a large works. Again, it is more or less dangerous to attempt to blow out all of the air in a purifier. No stated time being allowed for the operation, at one period the air is only half displaced, and again it is more than all expelled, thus causing an extra waste of gas.

Now the question arose, how best to carburet this air, so that it should have a commercial value, and thus make partial amends for the enormous amount of gas lost during the year, and utilize the naphtha vapor as a solvent of naphthaline. About October 1st we commenced using naphtha for this purpose. We raised the cover of the purifier about to be put on, sprinkled the naphtha on the upper tier of lime, and then replaced the cover. This mode of distributing the naphtha was not satisfactory; yet some benefit was realized from it—our reports of poor light diminishing noticeably.

Finding it required a great deal of time and labor to raise and replace the cover, and that the odor of vaporized naphtha was present in all parts of the purifying room, showing a great loss and some danger from handling so volatile a substance, I devised an injector for distributing the naphtha over the lime, inserting it through the plug-hole in the cover.

This device consists of a galvanized iron can (holding about 20 gallons) with a conical top, at the apex of which is a brass cap, through which passes the suction pipe of a small force pump; on the discharge of this pump is attached a rubber hose three or four feet long, with an L-shaped pipe on the end, having a brass spray nozzle capable of dividing the naphtha into a very fine spray, or almost a vapor. The L-shaped pipe is so formed that it may be easily passed through a small hole in the cover of the purifier, and direct the spray of naphthaline over the lime instead of into it.

The can is also furnished with a suitable vent, with a cap to be screwed on when not in use. By removing the plug from the cover of the purifier and inserting the L-shaped pipe, a few minutes' pumping will distribute the naphtha evenly over the lime without disturbing its level surface; and after replacing the plug the purifier is ready to be changed. No naphtha is wasted, there is no odor of naphtha vapor in the purifying room, no air to be blown out of the purifier to be put on, and no deteriorating effect upon the gas in the holder; and, last but not least, the reports of naphthaline stoppages cease almost entirely.

The quantity of naphtha required to carburet the air in a purifying box and connections is one gallon to each 30 cubic feet, or about one gallon to each 12 square feet of purifier. This will mix with an 18-candle gas, at 60° F., without perceptibly reducing the quality. At South Boston we use a less quantity; with purifiers 14 by 18 feet we use, with good results, 15 gallons of naphtha to each change.

As evidence that our naphthaline trouble is comparatively at an end, I may say that in the fall of 1883 we had continuous vexation from stopped services; but during the time we have, as described, used naphtha in the purifiers, we have had no trouble from naphthaline deposits in service pipes or street mains, and the outlet pipe from the holder at the works has shown no indication of its presence.

From October 7th to December 7th, 1883, there were 72 notifications of poor light; and during the corresponding months of 1884 there were but 42—a difference of 30 cases, or 41.6 per cent. less than in 1883. These notifications included the usual reports of "sags" in connections, bad burners, small fittings, etc., entirely independent from and not in any manner attributable to naphthaline stoppages.

On motion of Mr. Armington a vote of thanks was tendered to Mr. Jones.

*Discussion.*

The President—Gentlemen, you have just listened to a most practical and interesting paper—one which we all appreciate the advantage of. Personally, I know that about every other year we are obliged to "make a row" at our works because the men in charge of the purifying house will insist upon putting on a fresh purifier just about the hour the city is lighting up. It is rather singular how quickly that air travels uptown, and how speedily the people come hurrying into the office anxious to know what is the matter with the gas. When these hurried visits are made it occurs to me that the purifiers have been changed at about 4:30 P.M. Then I "raise the row," and have that changing system stopped. If we can remedy the difficulty at the expense of four gallons of naphtha, it is well worth considering. I hope the discussion will be general.

Mr. Armington—I would like to have the author explain more clearly how the naphtha is distributed. I believe he claims that he gets distribution over the whole of his lime. I do not understand how that can be accomplished unless he employs pipes lying inside or underneath the cover.

Mr. Jones—The paper explains that an injector, entering the box from a plug-hole in the cover, distributes the naphtha over the lime.

The President—The plug-hole is at one corner of the cover?

Mr. Jones—Yes, sir. The pump which forces in the naphtha is worked at a pressure sufficient to throw the naphtha spray over the lime.

Mr. Sherman—How do you direct its course?

Mr. Jones—By turning the pipe in any direction over the quadrant.

Mr. Armington—Do you think you get at the whole surface of the boxes?

Mr. Jones—I know it. I marked out a space in the yard equal in size to one of the purifiers we have in use, and I found that the naphtha was distributed over the entire oblong square—14 by 18 feet.

Mr. Armington—But you had a free atmosphere in the one instance and a confined atmosphere in the other.

Mr. Jones—Suppose it does not reach every part of the purifier?

Mr. Armington—The pressure was all off the purifier?

Mr. Jones—Yes, the pressure was all off; but we could put enough pressure on the pump to overcome any resistance inside the boxes.

Mr. Armington—Did much gas escape through this pipe in the plug-hole?

Mr. Jones—The purifier was off at the time.

Mr. Armington—But the boxes contained either air or gas?

Mr. Jones—Air was present in them.

Mr. Armington—Did the air escape through plug-hole when you were forcing the naphtha in? If you put 15 gallons of naphtha into a purifier already filled with lime and air, something must be displaced.

Mr. Jones—It will be the air; but to what extent I cannot say.

Mr. Allyn—What grade or gravity of naphtha do you use?

Mr. Jones—We have used the refined naphtha. It can be obtained from any refiner of petroleum, and it costs us 10 cents per gallon. I think the crude naphtha is fully as good; but at present we cannot obtain crude naphtha without purchasing a large quantity. We do not care to store it.

Mr. Allyn—My object was to find out what grade of naphtha gave you the best result. What is ordinarily called 60 gravity naphtha can be purchased at about one-fourth the price charged for that of 80 gravity. If 60 gravity answers the purpose as well, of course its employment would mean a very material saving.

Mr. Jones—I did not make any experiments with the different grades of naphtha. Ours is probably the 80 gravity.

Mr. Sherman—Years ago I remember seeing Mr. Wells, in the Roxbury (Mass.) works, sprinkling naphtha (using a watering can) over his purifiers

previous to letting down the cover. If Mr. Wells is present we would like to hear from him.

The President—He does not appear to be here just now.

Mr. Stiness—When we had the center-seal at our old works, we were of course troubled sometimes by this strata of air passing to the town lights. One of the advantages which may be claimed for the valve system, now in use in our purifiers at the new works at Pawtucket, I can best explain in the following manner: Last Friday (Feb. 13) we changed and cleansed a box; it was filled with lime the following day (Saturday). On Saturday night the back pressure on outlet from No. 4 was opened; the inlet, of course, being closed, the gas passing on to No. 4 purifier may remain until such time as we choose to open the box and put it into working order. With us it often so remains for two or three days; and when finally the confined gas is passed out, it is utterly impossible to detect the presence of any air going along with it. That is one of the advantages which I claim for the system of valves over the common center-seal.

A Member—What do you claim happens to the air?

Mr. Stiness—It mixes with the gas and passes off in such infinitesimal quantities that its presence is almost immaterial.

The President—Mr. Wells is now here; perhaps he can tell us whether he still distributes naphtha in his boxes with a watering pot.

Mr. Wells—We are still using naphtha, and still pouring it over the lime with a watering pot. We have been doing so for five or six years.

The President—What quantity do you use?

Mr. Wells—About twenty gallons each time we change. Our purifiers are 12 by 20 feet.

The President—You put it on before placing the cover?

Mr. Wells—Yes; before dropping the cover.

The President—And the air goes right into use?

Mr. Wells—That is the case.

Mr. Stiness—Do you find any condensation of naphtha in your service pipes?

Mr. Wells—I have never noticed any.

Mr. Sherman—Are you troubled with naphthaline?

Mr. Wells—Not at all.

Mr. Armington—What grade of naphtha do you prefer?

Mr. Wells—One of about 60 gravity.

The discussion herewith terminated, and the President asked if there were any routine matters to be disposed of before taking up the "question box."

### Naming Place Wherein to Hold Next Annual Meeting.

Mr. Harbison, speaking for Committee appointed to name a place for holding Sixteenth Annual Meeting, reported that Providence, R. I., had been selected. He explained that the vote in Committee had been unanimous. The report of Committee, after a short discussion, was endorsed by a vote of 20 for to 10 against. On motion of Mr. Harbison, President Greenough appointed Messrs. Slater and Stiness as a local committee of arrangements in connection with the Providence meeting. It was understood that Secretary Nettleton was also to act as a member of the committee. The members of Finance Committee were instructed, on motion of Mr. Stiness, to transfer the books of retiring Secretary and Treasurer to his successor in office (Mr. C. H. Nettleton) immediately after final adjournment.

### Proposing to Limit the Term of Presidential Office.

Mr. Stedman—It was the understanding of quite a number of our members that the matter which I am about to introduce was acted upon at the last annual meeting. It certainly was discussed at a previous meeting, and the impression is quite prevalent among the members that the matter had been formally acted upon and decided. The records fail to show any such action on the part of the Association; and I desire now to introduce a resolution which will settle the point.

"*Resolved*, That any member elected as President shall not be eligible to a re-election for a period of three years from and after the expiration of his term of office."

The President—You hear the motion of Mr. Stedman. I will say, for myself, that it certainly ought to have been acted upon last year. I thought it had been; but if not I think it had better be disposed of now. Is there anything to be said on this question?

Mr. Stiness—I know this subject has had previous discussion; but I feel, as stated by me in the past, that this Association had prospered under its existing plan of management, and I am satisfied with the course pursued heretofore. I will briefly state my reasons for opposing this motion. It is a plain, practical question. We are not here, as is the case with the American Association, gathered from all quarters of the Continent, and all of whose members it is almost impossible to gather at any given meeting. Therefore a short official term is perhaps a matter of good policy in that Association; although I believe it would be better for the American Association if that clause had not been placed in its constitution. I say to you, gentlemen, that he who occupies the Chair of this Association to-day can do more and better work for us after having served one term. We may find hereafter, as we did find to-day, that we owe it to ourselves to approve and endorse the position of our President by honoring him with re-election. Mr. Greenough—standing in the position he occupies at present before the citizens of Boston—is entitled to receive an endorsement at our hands—an endorsement justly his due. In time to come we may have others who will occupy a like position, and we may feel it to be then due to ourselves that we pursue a course similar to the one taken to-day; but if you pass the proposed resolution our hands would be tied, and we should find ourselves powerless to stand by our standard bearer. Earnestly do I hope that the motion will not prevail.

Mr. Stedman—I am not tenacious about this matter, and I am not clear in my mind as to whether it would be our best policy to adopt this resolution; still it is one that represents quite a prevalent sentiment as expressed here last evening in an informal discussion of the topic. Disappointment was expressed that the matter had not been disposed of at a previous meeting; and many members supposed it had been definitely settled. The President also spoke this morning in favor of the measure. I do not mean to argue about the expediency of the resolution; but it is simply left for your decision to determine whether the proposed rule would subserve the best interests of the Association. Our membership is large, and, as remarked this morning by our President, we have in our ranks numbers of men competent to assume the duties of the Chairmanship. It would seem rather invidious, remembering it has been our custom to continue a President in office for two terms, to single out any one individual and refuse to name him as his own successor, be the cause for such action what it may. This resolution would do away with that trouble, and would offer quite an extensive chance to our members to obtain the "perquisites" and "emoluments" of the office.

Mr. Nettleton—I am very sorry to differ from Mr. Stiness, and it seems to me the resolution ought to pass. We have been very fortunate in having good Presidents up to the present time (laughter); but we cannot always hope to be equally fortunate. Now, as Col. Stedman says, it has become a custom of this Association to re-elect each president at least once, and if ever we should be so unfortunate as to have a man in the Chair whom we would wish out, and should not re-elect him at the end of his first year, he would feel very much hurt, and the Association would be annoyed unnecessarily. By passing this resolution it does not become a part of our By-Laws; and if for any reason it becomes desirable hereafter to re-elect a President, this motion can be rescinded and the present custom can be re-established. I hope the motion will pass.

The President—You have heard the case properly argued. Those in favor of the passage of the resolution, "That any member elected to the position of President shall not be eligible for re election for a period of three years from and after the expiration of his term of office," will say, "Aye." Those opposed, "No." The Chair is in doubt. Those in favor of the passage of the resolution will rise from their seats. [A count developed a tie vote—14 in favor, 14 against.]

A short resumption of discussion ensued. Mr. Stiness hoped that all the members would vote on the question. He re-affirmed his belief that the best interests of the Association would not be served by its passage. Mr. Hill believed that the Association should not tie itself up by any such procedure.

The President announced that a second rising vote would be taken. When the preliminaries of same were concluded the Secretary reported that 14 were against and 12 in favor of the passage of the resolution. The President declared the resolution not passed.

### Taking Up the Question-Box.

The President said the next business in order would be a discussion upon the queries taken from the question-box. The first question taken therefrom was entitled,

"*What advances have been made in electric lighting during the past year?*

Mr. H. H. Fish, Treasurer of the Utica (N. Y.) Gas Light Company, was called upon to express his views on this matter. Mr. Fish responded as follows:

Gentlemen, while thanking you for the courtesy of your invitation, I must acknowledge that I am not in any practical sense entitled to the distinctive appellation of "gas engineer," as my connection with your industry was only arrived at after having spent many years of life in mercantile and commercial channels. Not being even a practical gas man, and much less an electrician, how can you then expect me to mention anything worth recounting in regard to that more subtle illuminant whose progress during the past twelvemonth you propose to discuss. Fifty years ago, on my first visit to New York city, the most striking thing that claimed my attention was the operation of a gas plant. Before I ate my first meal in the metropolis I had

paid a visit to the works of the only gas light company then existing in the city of New York; and I presume the entire money investment at that works did not exceed $30,000. When I reflect what steps have been taken in the short space of fifty years towards the development, progress and enjoyment of artificial illumination I may honestly assert that the gas maker's business stands second to no other one of those great industries which owe their creation and importance to the direct needs of the people of civilized countries. It was many years after that visit when I became identified with your craft, but still at a period sufficiently remote to be entirely conversant with the benches of three iron retorts, which would produce but about 6,000 cubic feet from the distillation of a ton of good Piedmont coal. You gentlemen understand much better than I do the approximate steps by which we have emerged from those humble conditions of working with iron retorts, at poor heats, etc. I may claim that I was among the first of those to try the clay retort—having imported a few from Belgium; and, as I remember, the importation was a cause of grave annoyance to my board of directors, composed as it was of lawyers and professional men. Step by step have we advanced until now we have the most approved forms of regenerator furnaces for heating benches of fours, sixes and eights. Indeed, since my visit here, I have inspected a plan for a setting of nines, which, I am assured, can be made to yield 90,000 cubic feet every 24 hours. In every other department of our business there has been registered a corresponding progress. From humble beginnings and high prices we have been enabled to reach that point where we are now furnishing an artificial light almost as cheap as sunlight. Having explained that I am not a trained gas engineer, and that my connection with the Utica Company has chiefly been but to look out after the pecuniary results of our operation, I have still always welcomed a trial of what purported to be an improvement, and so have thrown the Utica plant open—many of the fraternity think unwisely—frequently to the experiments of "adventurers," in the persons of men who claimed to have what they really had not. Among other experiences, ten years ago we extended to Mr. Lowe this privilege, who said that he could produce certain results with the agency of that process which we now call the "Lowe process." I told him I would not discuss the question with him, but he could come to Utica and make practical demonstration of his promises. I put our plant under his command for the space of time he specified, and I must say he made a most conspicuous failure of his attempt. He presided in person over the trial; and those who gave him financial backing lost their money. In the course of his experiment certain things were developed which looked to us as if they might, with proper handling, be turned to useful account. Another party took up the hints thus given, and with the result that ten years ago our city was lighted with what is called water or oil gas. We lighted our city (containing about 35,000 people) with it exclusively, using a very imperfectly constructed apparatus (one which had been very hastily improvised), for accomplishing the end in view. This apparatus became destroyed by fire, and then we returned to the old methods. Recently (or about two years ago) we ordered what is known as the "Granger Process," or the "Granger" style of apparatus for making what is familiarly known as water gas. Since last March we have been supplying our city exclusively with this gas; and very satisfactorily to our people too. Now, while all of you will sympathise with me when I say that we are not in the habit of getting more than is due to us from the journals of our neighborhood, on the morning I left home our daily paper published a list of ninety gas light companies in various parts of the United States, with a statement of candle power, and prices at which gas was furnished; and I had the great felicity of having my own paper (not over-generous in such matters) proclaim to its readers that our company stood at the head of the list, excepting only those who were located in the heart of the coal country.

In carrying out (where we could without prejudice) this principle of admitting a trial of improvements of any kind, I have also had, during the last three years, an electric plant in connection with our gas business. In the first place we got together a small plant, erected poles and wires, and allowed the different electric companies to experiment on what they could do. They could put on their own apparatus, lanterns, and dynamos; and, in fine, attempt to produce the results which they claimed for their systems. We paid the expense of plant, and they paid the expense for power. We went on in that way for eighteen months; and finally I became satisfied as to what was then the best system, as proved by a half dozen or more different ones experimented upon. We purchased that plant, and have been lighting a portion of our city with the arc system of electrical illumination. Now, so far as my experience goes concerning the question whether arc lighting is capable of doing injury to gas lighting, as exemplified in the "trial" portion of our city, the shopkeepers of that district are continually calling for more gas; and all because it certainly would not do for their stores to be less illuminated than the streets outside. Instead of lessening the sale of gas, it has largely increased it. I give you this as matter of actual practical experience, and I have had no reason to regret the experiment There is no money in electric lighting. It cannot compete, single-handed and alone (at present prices), with gas for lighting purposes. It makes a brilliant show, but in my judgment it never will come in competition for the great bulk of lighting now enjoyed and controlled by gas, unless it is vastly improved over what is the case with it now, and especially unless its expensiveness is greatly reduced. The question is one of economy merely. The incandescent light is certainly a very handsome one, but it is vastly more expensive than is gas. I must say that I have seen incandescent electric lights which, for excellence, comfort to the eye, and steadiness, were such that we might do well to attempt to reach their standard.

I am greatly obliged to you for the courtesy you have extended to me. I am sorry I am (owing to the effects of a recent dental operation) in so dilapidated a physical condition as to make me unable to respond more fluently to your polite invitation.

The President—Which electric system did you prefer and finally select?

Mr. Fish—I purchased what is known as the Thompson-Houston.

The President—I would like to say that the last improvement I have seen in electric lighting employs a very large incandescent burner. One of the first of these large burners was put up this winter in a Boston book store. It gives a light of about 100 candles, and it is the best illuminant for a store that I ever saw—more steady than the steadiest of gas lights—and gave out no heat to speak of.

Mr. Craft—I would like to inquire as to the relative expense of running the incandescent light (which the President has referred to) and that of gas.

The President—I do not really know that. I think the gentleman who had it told me he paid forty cents a night for it.

Mr. Craft—In your judgment, how much gas would furnish the same amount of light?

The President—I think we could supply the same amount of light fully as cheaply with gas. There is no question about it, but the incandescent light was the better light. I suppose the price at which it was put in was not a remunerative one to the electric company. This company was trying to introduce them. The Electric Company, of Boston, as I understand it, have made no money at the prices at which they are supplying light.

Mr. Stiness—If I understand Mr. Greenough aright, the same quantity of light could be furnished at a rate which would pay a nice dividend to the gas company; while the electric light was furnished at a price that paid no dividend.

The President—Probably. I am not prepared, however, to make that statement. I had never before seen an incandescent burner which gave a light of over fifteen or sixteen candles. This had a loop, perhaps six or eight inches long, and certainly gave a very beautiful light, and without affecting the atmosphere of the shop in the same way that a large gas burner would have done.

Mr. Stedman—I would like to call the attention of the Chairman to the application of the Siemens light as made on the Sound steamers. All the Newport and Fall River line boats that formerly were lighted by gas, are now lighted by electricity; and, in every case, the convenience of the light, and the possibility of manufacturing it on board, makes it a very desirable one. I believe it is a great boon to the traveling public. The cost, however, I am told by the supervising engineer, who lives at Newport, is greatly in excess of the former cost of gas. He said it was more expensive than gas; but it was such a great convenience, and so far in advance of any other system of lighting, they were prepared to pay the additional expense, and were very glad to get it even at that advance.

Mr. Stiness—In case of accident to the steamer, would the steamer have any light?

Mr. Stedman—They keep candles and oil lamps. (Laughter.) They have one or two of the large incandescent burners on the upper deck—not so large, though, as the one that has been described by the President.

### The Congratulatory Telegram Answered.

The President—In accordance with the suggestion of the Association, I telegraphed Gen. Andrew Hickenlooper this morning our congratulations on the birth of the new gas Association of Ohio; and in response thereto I have received this answer:

"M. S. Greenough, President New England Association of Gas Engineers, Boston, Mass.—Accept thanks for your congratulatory telegram. We appreciate the tender of fellowship from the mother to her last-born child. A. Hickenlooper, President Ohio Gas Association."

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### Second Day—Morning Session—Feb. 19.

The Association reconvened at hour named when adjourning. The President announced that the question-box queries and answers would be proceeded with. Question No. 2 was,

"*What is the effect of atmospheric change upon the candle power of gas—especially a low barometrical pressure?*"

Mr. Prichard—According to some authorities reduction of the barometrical pressure increases the bulk, and consequently reduces the candle power of each foot of the gas. Although the candle power would be the same fo

the whole original foot, yet the foot is larger—if I may so express it. I also found that when the barometrical pressure was high, the air was more dense, and a more vivid combustion was produced—that the slight increase of intensity increased the candle power.

Mr. Boynton—That question was suggested by my experience during the past winter. I found that on certain days it was very difficult to keep my candle power up to standard, and to keep the gas up to a constant pitch. There was to my mind no clear reason for this failing. I had to resort to extra amounts of enricher to keep up the usual quality. I found, from a comparison of dates with reports of the Signal Service, that it always occurred on days when there was a low barometer. The first impression would be if the barometer is high that the gas would burn easier—that any gaseous matter would rise through the atmosphere more readily; but that is not according to the facts. In the morning we frequently see the smoke from chimneys hugging the ground, and people say the air is heavy; yet the contrary is the fact. On the other hand, when there is a high barometer, you see the smoke rising out of the chimneys in a straight column and ascending upwards into the air. Take a chimney that is sometimes troublesome because of its "smoking." When is it the worst? When there is a high barometer, or when there is a low barometer? It is always the most bothersome at a low barometer. When the barometer is high the dense, heavy atmosphere will permit the smoke to ascend freely and the chimney will cause no trouble. Frankland may be quoted to the effect that with low barometer a better flame is given. It seems to me that that is not the fact. I put the question into the box thinking other members of the Association might have had an experience similar to mine. It seems to me the correct principle is that the lower the barometer the poorer your gas light will be. I found that it affected my gas (ordinarily 17½-candle power) to the extent of half a candle.

The President—I think we may consider that question as having been answered. The next query is—

"*Is a pipe around the retort house, between the hydraulic and exhauster, of any practical value?*"

That of course must refer to the relations between hot tar and gas. Some of the gentlemen have been building new works, and have probably considered the matter. We would like to hear Mr. Stiness' judgment about it.

Mr. Stiness—It would seem, perhaps, that question, in its "fullness," might go a little further. Under certain conditions, and under certain circumstances, a pipe running around the retort house might be of benefit, as a means of condensation, provided the other apparatus was not sufficient. In the new works which I built I looked into the matter of an English patent, an account of which was published in a recent number of the American Gas Light Journal,* in which the patentee, Mr. H. Aitken, speaks of the great benefit of keeping gas in contact with hot tar. In my particular case, I think that I have accomplished results equally as good as those he describes, and without the application of the machinery which he employs on top of his benches. I have no doubt that, if a condensing apparatus were insufficient, his plan would afford a means for condensing. If there is any value in his statement that, by keeping the gas in contact with the hot tar, you thereby retain the naphthaline, then his plan is beneficial; but in our particular case we thought it was not best to cool the gas off too quickly. I think the peculiar circumstances and conditions of particular works must be taken into account before the matter can be decided in any set instance.

Mr. Slater—We have had a little experience bearing on this point. You will recollect, some two or three years ago, when we first started the Dieterich furnace, I made the statement that shortly after firing up those furnaces our candle power began to increase, and we kept reducing the cannel until we got down to one or two per cent., finally abandoning the enricher altogether, and yet maintained the original candle power. Starting in at that time with the Dieterich furnaces, it was supposed their working had much to do with the gain in illuminating value so suddenly experienced. The retort house, as originally constructed, had the take-off to the condenser house in the center of the house; at one end of the retort house was a stack of 20 benches of sixes, and at the other end was one of 24 benches. In reconstructing the retort house we divided up the two long stacks, and built two stacks of eight benches each on either side. When we fired up the Dieterich furnaces we started the stack next to the take-off that went over to the condenser house; and when we had abandoned that stack, and started the one on the extreme end of the house (or at a point where the take-off had to run the whole distance of that side of the house to make connection with take-off going over to condenser house), of course a much longer pipe was traveled in the transit. We found that we had to use 7, 8, or 10 per cent. of cannel to maintain the candle power that we had under similar conditions with the first stack. Finally we came to the conclusion that this long take-off line had something to do with it. In that view, we covered this take-off, from stack on extreme end of house, with hair-felt and asbestos cloth; and since that time we have found that we could maintain the same candle power with much less cannel—thus showing that the hydrocarbon vapors were largely condensed in the long pipe, which was exposed to considerable cold.

The President—Instead of taking anything up from the gas, you actually increased the candle power.

Mr. Slater—Exactly.

Mr. Stiness—You cooled it too quickly before?

Mr. Slater—Yes.

The President—Here are two questions which can be taken together. The first is—

"*What candle power coal gas can be maintained by enriching with naphtha introduced with steam into a retort of the ordinary setting?*"

The second is—

"*Which is the best method to use oil as an enricher, and the kind to be used?*"

Those two questions can be considered at the same time. Perhaps Mr. Jones, of South Boston, will give the results of the way in which he uses oil.

Mr. Jones—At the South Boston works we use petroleum residuum for the enriching of our gas, or the heavy oil from the bottom of petroleum stills. We mix it with breeze, or saturate the breeze with the residuum, and put it on top of the charge of coal. The men who charge the retort throw in a shovelful of this mixture. The breeze is employed simply as a vehicle for holding the residuum; we find it to be better than fine coal, and have made experiments with almost everything. We use about 2½ gallons of this heavy oil to the ton of coal carbonized, and maintain from 18 to 18½ candle power gas.

Mr. Neal—I have, acting upon a suggestion from Mr. Jones, used that method for quite a length of time, following his plan very accurately; but I do not get as good results as those obtained by that gentlemen. Indeed, the method failed to exert any beneficial effect upon the candle power. Nevertheless, though satisfied as to its non-influence upon the illuminating value of the gas, I continued the system in the hope of preventing naphthaline deposits. Defeat also met this endeavor. After a visit made by our superintendent to a New York gas plant, we adopted a very simple process which he saw in use there. It consisted of injecting naphtha with steam into the retorts. Mr. Prichard has tried this plan very thoroughly at the Lynn works, and I think if called upon he will explain the method.

Mr. Prichard—We were using the residuum at the time the matter came up, but were dissatisfied with the results produced. It seemed to me that we were introducing oil just at the very time of the charge when we were producing the richest gas; consequently we did not produce carrying gases enough to carry it along, and possibly left it in the hydraulic main. We looked around for something else, and as a result of several inspections of different processes we placed in the retort a steam injector, and injected the oil by the aid of steam, making it travel three or four times the length of the retort. Any means can be adopted which will accomplish that end. The steam seems to keep the temperature of the retort at just the point needed to produce the best results from the oil. The consequence is that we have been able to get along very well. As the result of three months' use we increased our candle power by one candle; and the average expense for the three months was only $28. Of course we used a greater value of oil than that, but deducted from its cost that of the coal which we did not use, owing to increased yield.

The President—What quantity of oil was that per thousand feet of gas, or how much oil per ton of coal?

Mr. Prichard—We used all the way from one-quarter to three-quarters of a gallon to the thousand feet of gas, according to the temperature. We are using now about 5 gallons to the ton of coal.

Mr. Neal—I think that up to within a month at Charlestown we used about half a gallon per ton of coal. Our candle power was brought to as high a point as 18½. We are using iron sponge in purification, and the employment of this material is said to cause perhaps a depreciation of one-half candle in illuminating power; but still, even with the use of the iron sponge, our candle power has been increased. I consider it the very best manner of enriching. We did employ a superheater—an iron pipe for the steam running through the lower tube and under the bottom of the retort. It was very difficult to keep that pipe from being destroyed by the heat; and so we are now working without superheating the steam at all. At my works the boiler is some distance from the retorts, and the steam pipe runs quite a length in the yard. It is true that it is covered with an asbestos jacket; still, although considerable water goes over, I find our results are nearly as good as the best.

Mr. Harbison—At what time of the charge is the naphtha put in?

Mr. Neal—It is put in a retort by itself, and this retort is kept in action constantly. Steam must be kept continually passing through the pipes in order to prevent them from melting down.

Mr. Stiness—Before Mr. Prichard described to me his method of working

* See Journal, Vol. XLII., Feb. 2, 1885, p. 68.

I was using oil as an enricher under the common injection plan. After he spoke to me I set apart the lower retort of a bed of sixes, and have been running along in that style now for about two months. I must say that I consider it one of the very best arrangements I have ever seen for this use of oil. A ¾-inch pipe runs inside of a 2-inch pipe; then it passes back through a 6-inch pipe; then passes up through the retort, and out through the stand pipe in the usual form. There is no coal used in that retort; its duty is to carbonize the oil for enriching. The steam is kept continually passing through. I have a plug-hole in the mouthpiece by which I can tell the heat of the retort at any time. We have never made any lampblack; and we know from the tap which we have upon the stand pipe as to the quality of the gas that we are making. If any member desires to use oil, and will consult with Mr. Prichard, he will give him a description of the process; and I would advise every member of the Association who is desirous of using either oil or naphtha for enriching purposes to adopt Mr. Prichard's method of working. The oil we use is of 55 density.

Mr. Gerould—We use the same quality at Manchester; but the size of pipe running into retort is smaller than that spoken of by Mr. Stiness. We run it in with a ¾-inch pipe, bring it back with a 2-inch, and then it flows out into the retort. We use about 50 gallons of naphtha in sending out a daily average of 360,000 cubic feet of 18-candle gas.

Mr. Learned—I would like to ask Mr. Prichard if he finds any increase in the carbonic acid caused by injection of steam.

Mr. Prichard—At one time I drew off some of the gas and tested it for carbonic acid and carbonic oxide, and found about 2 per cent. of the former and about 8 per cent. of the latter in the mixture. This proved that the steam did make a trifle of water gas, and did combine with the oil to a certain limited extent. We cannot tell just how greatly it increases the carbonic acid, because we use iron sponge entirely, and fear we lead the New England Association in the amount of carbonic acid gas contained in our product.

The President—The question after all is, "which is the cheaper way of enriching gas—whether with naphtha or with cannel?" Mr. Slater has enriched with both these materials, and we would like to hear his opinion.

Mr. Slater—We are now using cannel entirely. Our experience with that use of naphtha was rather crude. At the works (the former opposition plant) where naphtha was employed, they followed the practice of placing an iron pan in the retort, and injecting the naphtha with the aid of air pressure. It was supposed to be driven nearly to back end of retort, and then converted into gas on coming back again to standpipe; but, as matter of fact, little of the naphtha was converted into gas. It was found more or less in the dips, and was discovered even throughout the main pipes.

The President—I would like to ask some of those gentlemen who have been using naphtha what, as the result of their experiments, they think the value of naphtha really is. I propose the query for this reason: We have been making some experiments in that direction with the idea of determining, all things considered, what would prove the most economical form of enricher. We tried the method of injecting naphtha into the retort, afterwards collecting the naphtha gas to arrive at the volume and the candle power it possessed. About the best we could do per gallon was to obtain somewhere between sixty and seventy feet of 50 or 60-candle gas. If we carried the yield up any greater we found a shrinkage in candle power. When you convert the yield into candle feet, or convert it into water gas, it would seem as though a good deal more candle power ought to be got out of a gallon of naphtha than we succeeded in obtaining. Possibly this may come from the higher temperature of the flame which is given for carbonic oxide. If any gentleman here can secure from naphtha a yield of sixty feet of sixty-candle gas, or eighty feet of fifty-candle gas, I would like to have him say so. What is Mr. Gerould's experience?

Mr. Gerould—We have not experimented in that direction. We have only noticed the illuminating power of our gas when working under the injection plan, and using 150 or 200 gallons of the "gas oil," would approximate to 17¼ candles. Since using naphtha in the way described the candle power has run up to 18¼.

The President—Then the oil you employed before was not naphtha?

Mr. Gerould—No; it was a regular "gas oil."

The President—And you think naphtha is very much better?

Mr. Gerould—Yes, sir.

The President—What do you get from the naphtha, Mr. Prichard?

Mr. Prichard—About sixty feet. I believe in using the lighter oil. We tried the residuum, afterwards tried the "gas oil," and finally the naphtha; but we found that the lighter the naphtha was the better were the results we obtained. My idea is that you have not got so much carbon to deposit, and you can make a permanent gas much easier.

Mr. Gerould—We have tried the plan of injecting oil, and we found that lampblack was deposited in the retort. We could not get rid of it. We used steam without superheating, and still got the lampblack; but with naphtha we did not get it at all.

Mr. Sherman—Some of the gentlemen may have seen the paper which was read before the American Association at Pittsburgh.* The writer of that paper had an extended experience in the distillation of naphtha for gas purposes; and he stated that sixty feet of 80-candle (or eighty feet of 60-candle) gas was about the product on and illuminating value of a gallon of naphtha. According to his figuring the quantity of gas weighed as much as the oil; and that was "the cat and the skin." (Laughter.)

Mr. Neal—Although I like the Prichard process, and while making five feet of gas to the pound, I have carried up the candle power higher than we ever did at the Charlestown works; still, if I could get a moderately small cargo of Cannelton coal I should use it in preference to the naphtha for enriching. Cannelton cannel yields a fair quantity of good coke; but the difficulty with us is in getting a small cargo brought to our works.

Mr. Nettleton—I would like to ask the gentlemen who recommend the use of naphtha if they have any complaint to make as to the gas smelling of the oil. We used naphtha for enriching some years ago, and, so far as I know, the people were not aware of the fact; yet I had some complaints brought in that the gas smelled like kerosene. As a consequence I felt compelled to stop using it.

Mr. Prichard—If the gentleman makes oil vapor the gas will smell of oil; but if he makes a fixed naphtha gas, where enriching with it, there is no reason why the resultant gas should smell of oil. How could it when the oil has been thoroughly decomposed?

Mr. Stiness—I use three gallons of oil to the ton of coal. I have a cock placed upon the stand pipe by which I can always tell exactly how I am working. If at any time I find that the heat of the retort has gone down I instantly shut the steam off. We send out an 18 or 19-candle gas. Working in this manner you can bring your illuminating value up very quickly.

Mr. Stedman—What did the gentleman consider as his chief object in using steam? Was it for the injecting of the naphtha, for the purpose of keeping the retort at the necessary temperature, or with the object of effecting chemical combination of the products resulting from the decomposition of the naphtha?

Mr. Stiness—Injecting naphtha and reducing heat.

Mr. Prichard—I believe Mr. Stedman was not in the room when I first spoke. My notion of such use of steam is that, in the first place, it is useful as an injector, and that it forms a sort of vehicle to carry off the particles of carbon. You can control the temperature of your retort by the steam; in fact it serves a number of very useful purposes.

The President—I will say the result of the experiments made by us, although we did not push them very far, point to the conclusion that if we were desirous of making 20 or 21-candle gas that illuminating value could be secured at a less expense with naphtha than with cannel coal; on the other hand no money can be saved in using naphtha enricher when sending out 18-candle gas. I have yet to hear of any works where cannel is easily obtained that abandoned its use and substituted naphtha therefor. There are disadvantages connected with the employment of naphtha as an enricher which do not admit of solution, and on the score of economy too. How is it with you, Col. Stedman; do you not use cannel?

Mr. Stedman—Yes; we rather prefer it to naphtha.

[To be Continued.]

[Official Report.—Continued from page 177.]

## Papers Read before the First Annual Meeting of the Ohio Gas Light Association, with Discussions on Same.

First Day—Wednesday, Feb. 18.—Morning Session.

The discussion on Mr. Bate's paper having terminated, President Hickenlooper announced that two gentlemen had presented communications on the topic next to be considered; he suggested that the authors be in turn requested to read their papers, so that contents of both might be discussed conjointly. This course was agreed to, and General Hickenlooper introduced Mr. E. McMillin, of Columbus, Ohio, who read the following paper on

### The Prevention of Naphthaline as a Deposit in Gas Works Plant.

This subject, fruitful of so much annoyance, has not been fruitful of much literature. "King's Treatise" barely mentions it; gives us no light on the question of its production, nor tells us how to prevent its crystallization and consequent deposition. Bowditch discusses it, but not so exhaustively as the importance of the question would seem to demand.

Its symbol is $C_{10}H_8$. You will observe from its composition that it is very heavy—4½ times as heavy as air. It is not surprising, therefore, that it is deposited at inconvenient places about the works, in the mains and services, and in the consumers' meters. When chemically pure it solidifies in the form of beautifully white crystals. When found about the scrubbers it is

*See Vol. XXXVII., No. 11, pp. 252-255, issue Dec. 2, 1882.

generally dark-gray, or almost black—made so by the intermixing of foreign substances. When found on top of your fouled oxide boxes, where it has dropped from the sides and top of box covers, it is thin, and clear almost to transparency. When blown out of service pipes it is found mostly resembling flakes of polished steel.

Naphthaline is probably formed during two stages of the carbonizing period. First, when the heats are greatly reduced by the introduction of the fresh charge of coal; and, second, toward the close of the period of carbonization, when the heats are very high.

During the first stage it is drawn off probably as it bursts from the solid coal; and, being surrounded by or dissolved in other rich hydrocarbons of less density and more stability, it is carried along through the works and gives the manufacturer no trouble, at least until it has passed through the gasholder.

During the second stage, or that of high heats, it is formed by the decomposition of the lower hydrocarbons—possibly, and inded probably, that of $CH_4$. It seems strange that at this stage of the process it should be possible to have decompositions occurring diametrically opposed, or apparently so. We usually attribute the formation of pure carbon to the decomposition of hydrocarbons, setting free the hydrogen and depositing the carbon; and at any rate leaving the gas heavier in carbon than before. But experiments have demonstrated that at this same stage hydrocarbons are broken up, hydrogen set free, and a richer hydrocarbon (naphthaline) formed. My own idea is that the opposing results are brought about, not by the decomposition of similar hydrocarbons, but of compounds belonging to different series.

We are probably more interested in how to be rid of its annoyance than in knowing how it is formed. All coal gas works make it. The question is, "Can we carry it in a gaseous state to the tip of the consumers' burners, and with it there add brilliancy to the light?" It is generally conceded that sudden cooling tends to augment the deposition of naphthaline; but we must not confuse the idea of low temperature with sudden change. To quickly cool gas from 140° F. to 80° F. would probably give more trouble from naphthaline deposit than would the slow cooling of the gas from 80° to 10° below zero; though in the latter instance the total change is much greater than in the former.

Suddenly cooling your gas not only affects the naphthaline directly, but also incidentally it causes the deposition of the carriers of this heavy gas, condenses the solvents, and lets fall the naphthaline, as it were, of its own weight.

I would therefore suggest the advisability of cooling your gas slowly; use the least possible quantity of water; do not use lime for sulphur purification (and thus necessitate the throwing away every day of large quantities of rich hydrocarbons); keep your gas up to 18 candles; lay your mains below frost; and, if possible, have no service pipes passing through areas at the sidewalk unprotected.

If all these conditions are observed you will experience little annoyance, and even secure great benefit, from the formation of naphthaline. Five grains of naphthaline is said to be worth, as an illuminant, 140 grains of common coal gas. If this be true, it should be regarded as a friend rather than an enemy of the gas man.

Bowditch tells us that naphthaline chemically combines with the coal gas at warm temperatures, but that the union is so feeble that it is broken when the temperature is much reduced. I cannot believe that there is any chemical union; I think it is carried along as is water vapor, and that sudden cooling compresses the gases and condenses the naphthaline—squeezes it out of the gas.

The second paper on this subject was written by Mr. Joseph Light, of Dayton, Ohio. Mr. Light was unable to attend the meeting, and forwarded his communication to the Secretary. When Mr. McMillin had concluded his presentation of the topic, the Secretary submitted the following as Mr. Light's views upon the matter—

*Mr. President and Gentlemen:* I think that our worthy Secretary has made a mistake in asking me to read a paper on the subject of, "The Prevention of Naphthaline as a Deposit in Gas Works Plant." My experience with that pest of gas managers is luckily rather limited, and there are other brethren here who have had more extended knowledge upon that question than the writer, and consequently are better fitted to do the subject justice. What little trouble I have had has been almost altogether encountered in my street mains and service pipes. I will, however, state what has come under my observation with reference to it.

In the spring of 1883 we purchased one year's supply of coal. Our coal house not being sufficiently large to contain it all, we were compelled to stack a goodly portion of it outside the sheds, or where it was exposed to the weather. Knowing that I would have to use this outside coal every day, if I wanted to absorb it all before the rough weather set in, we took the coal, wet and dry, just as we found it. During the latter part of the summer and through the fall season complaints were made at our office by our consumers about want of pressure. Sometimes the complaints came from the west side, or low part; and next complainants would appear from the east or high part of the city; and so the trouble went on. In our investigations I at one time found a 2-inch main filled so completely that no gas would pass through it. I resorted to naphtha to dissolve it.

Our trouble continued in a varying sort of way until cold weather set in; then with winter's arrival the naphthaline disappeared, and so we experienced no further bother from it. In 1884 I concluded I would make a slight change, inasmuch as I determined not to carbonize any damp or wet coal during the summer months. When we could not get any dry coal from the heap not stored, I used the coal that was put in the sheds. I am pleased to say my experience was such that complaints of naphthaline deposition were few and far between.

The coals used in 1883 and '84 were of about the same grade, coming from the "second pool" of the Youghiogheny River. Our mode of working in summer of '84 was just the same as that of the previous year. Our heats were, if anything, a trifle higher during 1884. Our only change, in fact, was in carbonizing only the dry coal; but I may say, acting under the advice of a friend, I covered the water inside of my gasholders with a light crude oil of about 45 gravity. I also put some of it in the drip boxes, which had a beneficial tendency.

*Discussion.*

President Hickenlooper hoped all the members would have something to say in regard to topic treated of by Messrs. McMillin and Light.

Mr. Bate said he had some experience with naphthaline deposits. At the September meeting he made the remark (one he had often heard others make before) that he did not know what naphthaline was. Some one at the time suggested that when he (Mr. Bate) went home he might find plenty of it. After his arrival at Tiffin he did "find" it. When the naphthaline bother was first encountered by him he did not really know what was causing the stoppages at his works; but he did know that suddenly the plant (it was on night watch) had been completely "choked off." He instituted search for the cause, and upon opening the coke scrubbers found a dirty, greasy oil deposited in them. He also found considerable accumulation in inlet connection to the purifiers, and also in the boxes. At the first onset no deposits were found at points beyond the purifiers. On the second discovery of its presence the deposits were found at inlet of holders. He procured ten gallons of 74° naphtha, lifted up the purifier covers, and thoroughly wetted the lime; then turned the gas on again, and had no more trouble for that time. He, as said before, experienced other attacks from the same enemy, but the naphtha application put it to rout. Mr. Light offered the theory that wet coal causes naphthaline deposit. Mr. Bate happened to be carbonizing the driest sort of coal at the time he first encountered the trouble; and he might also say that during last January his coalmaster had been delivering very wet coal to the Tiffin works, yet not even a trace of naphthaline had so far manifested itself. He might justly claim as his opinion that the wet coal argument was not sound. He was using a steam jet exhauster; and he found that at times, in consequence of carelessness or inattention to its working conditions the men would allow everything to become completely overheated. Under these circumstances permitting a cold stream of water to enter the coke washer and strike the overheated gas, led him to believe was the real cause of his naphthaline trouble.

Mr. McMillin noticed that Mr. Light attributed the formation of naphthaline to wet coal; and the speaker failed to penetrate either the philosophy or chemistry of the statement. Mr. Light had trouble when carbonizing wet coal; but the author of the paper would probably discover that a great many gentlemen were there present who had had the same trouble when working with dry coal; but, on the other hand, did not encounter naphthaline at time of using wet coal. He thought the wet *vs.* dry coal theory was not apt to be of much account.

Mr. Converse asked what would be the effect on naphthaline when using oxide of iron in the purifiers? He understood the oxide would destroy any greasy or tarry matters so deposited.

Mr. McMillin did not think such was the case.

Mr. Hamlin said his experience with naphthaline was quite similar to that recounted by Mr. Bate. He hardly knew what it was; but during a conversation, in which he heard the characteristic features of naphthaline spoken of some time ago, he then recollected (and had solved the reason therefor) a stoppage that occurred some five years since at his works—which were on a small scale. On that occasion he found the outlet from the condenser completely choked up with a thin, scaly substance, brown in color, and vile in smell. The brownish tint, he concluded, was owing to tar admixture. When the flakes were carried into the open air and exposed to the light they dissolved. That was the extent of his trouble with naphthaline deposit. All portions of his apparatus were free and clear of its presence. He used a steam jet exhauster, and he made it a point during cold weather, at the periods when not making gas, to keep a small jet of steam passing through to keep the pipes and scrubber warm. His idea in having a spray of steam

constantly playing on the coke in scrubber was to prevent the coke from becoming very cold, so that when the gas was turned on to the vessel it might pass freely through the coke filling—for undoubtedly the gas would find a quicker passage through the interstices when the coke was properly warmed than would be the case if the filling material were allowed to become very cold. It was a very small jet—not sufficient to cause any overheating; in fact, of just the dimension to accomplish the object sought after.

Mr. Bate thought that Mr. Hamlin's scrubber differed from the speaker's. Mr. Bate's scrubbers were located in the purifying house, and consequently were never allowed to become cold. Some years ago a method followed by a friend was described to him. This friend explained that he inserted a jet of steam into the coke scrubber, and he did so with the purpose of keeping the coke free of tar—by thus warming it up. He (Mr. Bate) did not believe in that plan; for when he attempted a similar policy the tar became cooked into such a solid mass that the works were completely shut up from it.

Mr. Hamlin explained that his way of passing steam neither overheated the scrubbers nor cooked up the tar. The small jet of steam was only turned on when they were not making gas.

President Hickenlooper gave a hint or two as to the naphthaline experiences at the Cincinnati works. He did not think any of the previous speakers had assigned a good reason for naphthaline formations. He believed the causes at work in Cincinnati must be unique, inasmuch as they could tell when it would appear and depart. They could expect it on the first of November, and it remained with them for fifteen days; the second visit would be made on March 1st, the spring visit equaling in duration that noted in the fall.

Mr. Dittmar agreed with President Hickenlooper. A great many theories had been suggested. One superintendent claimed one thing, while a second advanced a different theory, and so it went on; but as for himself, he failed to find a theorist yet who had offered any substantial argument that would explain his hypothesis. Mr. Dittmar's worst naphthaline trials were sure to take place in the fall of the year. During October his works were often completely blocked up. Upon being freed they might choke up again or they might not; he never could tell when he was safe. Some years ago, before he had had any prior experience with it, he was hastily called to the works. He found the gas blowing out through the purifiers—not a foot going on to the holder. He was at a loss to account for it. He disconnected the purifier outlet, and found it to be entirely closed with a grayish-brown colored scaly substance. He tried several solvents, and found that a light oil would cut it out more quickly than anything else. He cleaned out the pipes, and for quite a while thereafter filled the lower trays of the purifiers with sawdust saturated with oil. This plan gave every satisfaction.

Mr. Gwynn asked if any of the members present had ever experienced trouble from naphthaline while using cannel coal.

Several affirmative responses were received to the query.

Mr. Coverdale—I would like to mention my Des Moines (Iowa) experience with naphthaline. These works had been newly constructed, and were running quite smoothly, when, without the slightest warning, we were unable to deliver a foot of gas. We "steamed" out the plant, and it operated all right for about a week—then came another enforced cessation. We could not assign a reason for the stoppages, but finally reached the conclusion that the trouble arose from the manner in which we had connected the machinery together. For instance, pipes leading from the hydraulic main went underneath the cellar, then came up and entered the tower scrubber; and from that we had a pipe which conveyed away all condensation from the steam jet exhauster to the tar well. We could not assign any other reason than that we extracted (at an improper period) too great a quantity of ammonia from the gas—that there was not enough ammonia left to keep the machinery clean, or prevent this naphthaline forming. As an experiment I had a box filled with ammonia and fitted with connection for pipe placed in cellar of condenser room. From that out we never had a stoppage in the works; and I believe they have never had one there since. My theory was that a sufficiency of the ammonia contained in the box was vaporized and carried along with the gas in traversing the rest of the plant, the tendency of the ammonia vapor being to keep the connections clean, if I may so speak. At any rate, that is all we ever did to eradicate the naphthaline trouble; and it seemed to have been efficacious.

Mr. Fullagar—I have had a by far too extended acquaintance with naphthaline deposit, and allow me to say that your theories are at best but fancies. We have worked under high heats and low heats; we have carbonized cannel coal and bituminous coal; used wet coal and dry coal—the ill-smelling flakes flourish and make no note of the conditions. The first place it troubles us is in the stand pipes of the holders. We place a barrel of oil in every holder on about the first of each November, and we have found the practice affords us a great help. I believe the principal cause of naphthaline stoppages in the machinery of a gas works is carelessness in the matter of keeping the pipes clean. The only place we find naphthaline in the oxide of iron purifiers is where the gas strikes the sides and top of the box covers. With a sudden fall in temperature (and continuing say for 3 or 4 days) of 15 or 20 degrees, we sometimes find flakes lying on the top of the oxide. With a temperature of 50° or 52° we have plenty of naphthaline deposit. Remove the upper layer of oxide and no trace of naphthaline deposit is discoverable; and now I submit that fact proves the scales are formed from contact with the not over-smooth covers of the boxes. We never discover naphthaline in any of our pipes until the stand pipes in gasholders are reached. I think you will find all cures amount to the same thing. Go back to the old system of making gas that prevailed in 1850, and you will not know what naphthaline is; work at low heats, send out a high candle illuminant, and your naphthaline troubles will cease.

Mr. Salter—About three years ago we were troubled with naphthaline to such an extent that our works were stopped up. We then changed to the use of a steam-jet exhauster, to determine whether the fault was traceable to the Mackenzie exhauster we had been operating with at the time of the "blockade." We ran along for probably three weeks; but the change did not seem to make any difference. We had just as much naphthaline as before—indeed it was deposited to a greater extent. I should not, perhaps, say it was naphthaline, for the scales consisted partly of soot. We continued to use the steam-jet exhauster, and after a while the deposits ceased forming. We yet find some traces at different points, but these are not worth mentioning, as they never cause us any annoyance.

Mr. McMillin—I think there is no mystery at all about how naphthaline is formed. I think it is formed just as stated in my paper; it is driven off from coal at low heats, and it is formed by the deposition of hydrocarbons at very high heats. Unquestionably the worst trouble with it occurs always in the fall and spring of the year, but particularly in the fall. It is, however, formed more or less every day in a gas works plant. It is formed a great deal more at high carbonizing heats than at low ones. That which is formed with high heats is produced when you are making very poor gas, and there is nothing to carry it or hold it in suspension. Why it should be deposited more in the fall than in the spring of the year I do not know. Of course, it is simply owing to the changes in temperature. It is possible that the cooling to which gas is subjected in our holders may cause it to settle in the tanks. In October, at midday the sun shines warm, while the nights are quite cool; but in the winter season the temperature falls so low as to cause to be deposited whatever cannot be carried out by the gas before it enters the mains.

The President—Suppose you reverse that proposition, and take summer time?

Mr. McMillin—I know it is a poor rule that fails to work both ways. Doubtless the same rule will apply, then, too; but I would like time to figure that out. It is simply the change of temperature in those two seasons—the difference between the temperature of the earth and the temperature of the holders.

Mr. Fullager—At the new Cincinnati works the gas passes through a long hydraulic main, and by the time it reaches the hot scrubber its temperature is in the neighborhood of 60°. It passes out through a 20-inch pipe, then enters a 24-inch one, and traverses a distance of about 600 feet before it reaches the condenser. A few days ago we found great pressure on the condenser, and discovered that it was completely stopped in the bottom of the tubes. Why should it deposit itself at that point and not in the pipes?

The President—But Mr. Fullager ought also to state, in the same connection, that some two or three weeks before, the deposit passed the point just noted and formed 40 or 50 feet further on, or in the inlet to the washer-scrubber.

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### First Day.—Afternoon Session.

The proceedings of afternoon session of first day were commenced by Mr. Irvin Butterworth, of Columbus, Ohio, who read the following paper on the subject of

#### Natural Gas; what is it, and can it become a competitor of coal gas as an illuminating agent?

Considering that this subject is one in which gas men of this State ought to be interested, comparatively little is yet known concerning it. Not being an original investigator myself, however, I would, at the outset, forestall any expectations that the aggregate stock of knowledge possessed by the fraternity on the subject will be augmented by this paper.

Under these circumstances I will not be so presumptuous as to occupy much time, but will simply give a few facts that I have been able to gather from the meager sources I have had at command concerning the probable origin of natural gas, its composition and properties, its geographical and geological location, adding thereto a few thoughts as to the likelihood of its becoming a formidable rival of coal gas as an illuminant.

As to the origin of natural gas, there seems to be little doubt that it has been generated by the slow distillation, during past ages (and continuing at present), of bituminous matter buried in the earth's crust; and, furthermore, that in this section of the country this bituminous matter is contained in the

formation geologically known as the "Huron" or black shale. This black shale contains from 8 to 20 per cent. of carbonaceous matter, and in substantiation of the theory that natural gas derives its origin from it, we can, in our laboratories, easily generate from this shale a gas exactly identical with that which issues from the ground as natural gas, and also the oil with which it is always associated.

The origin of this bituminous matter itself is a subject of more interest to the geologist than as a question of practical importance to the gas man. An interesting theory, advanced by Professor Newberry, is that it comes from seaweed, which grew abundantly in the oceans of the Devonian age. Wherever this shale exists natural gas is found; or, rather, wherever natural gas is found this bituminous shale exists. This statement is true with reference to this section of the country. Other formations in different parts of the world produce natural gas.

This formation of black shale extends from Central New York westward and southward through western Pennsylvania and into West Virginia. In western Pennsylvania it is buried many hundreds of feet under overlying sand rock and other later formations, gradually rising to the surface as we come west, until it finally outcrops in Central Ohio, where it is 300 feet in thickness.

It must not be understood that in boring for gas the drill must penetrate this shale. The formation is simply nature's great retort, where the gas is generated; the holder is the superincumbent porous sand rock, which takes up the gas as generated, as a sponge absorbs water; and the presence of this porous rock is just as essential to the existence of a productive gas well as is the bituminous shale itself. In western Pennsylvania the geological conditions for the existence of natural gas wells are the most favorable. There, in addition to and overlying the bituminous shale (which is probably thicker here than it is further west), are found three great series of gas rocks, aggregating a thickness of 3,000 feet. As we travel further west these formations rapidly become thinner, until the shale itself when it obtrudes at the surface in central Ohio, is only 300 feet thick, while the sand rock has but a feeble and fitful development, except in the northeastern corner of the same State. All these geological indications are verified by the facts. Gas wells are strongest and most abundant in western Pennsylvania, and become weaker and fewer as we come west, ceasing altogether with the terminus of the bituminous shale in central Ohio. The only exception to this, so far as I know, is the well recently opened at Findlay, Ohio. This city is beyond the western limits of the gas-bearing region, and the existence of natural gas at that point is as yet an unexplained anomaly. Last August natural gas was also found at Crestline, Ohio; but this city is situated on the outcrop of the bituminous shale, which extends in a belt from 10 to 20 miles in width, reaching from the mouth of the Huron river, on Lake Erie, to the mouth of the Scioto. Gas is now being bored for at Logan and Ironton. These cities are both within or near the belt of outcrop; but it is by no means certain that gas will be found there in paying or permanent quantities. Natural gas has in past years been found in different parts of the eastern part of the State, while boring for salt, with which, as well as with oil, it is always associated; but in no case has the supply been uniform and permanent.

With regard to the chemical composition of natural gas, the only analyses I have been able to find were those given in the American Gas Light Journal of November 17, 1884. From these it would seem that natural gas varies somewhat in chemical composition, according to the locality in which it is found. An average analysis of the gas from the region of Erie, Pa., would show, according to this authority, about the following composition: $CO_2$, .35 per cent.; CO, .50 per cent.; H, 5 per cent.; hydrocarbons of the marsh gas series, 95 per cent. I believe some authorities put the quantity of $CO_2$ considerably greater than that given in the analysis quoted. We see that the gas is composed almost entirely of the light hydrocarbons of the marsh gas series, thus accounting for its inferior illuminating power, which varies from 8 to 24 candles—the latter power being obtained only by the use of the Argand burner. The specific gravity is almost double that of coal gas, and the calorific value one-third greater. Natural gas, as a rule, has no odor—at least not a disagreeable one. A noteworthy exception to this is that "freak of nature" before referred to—the natural gas at Findlay—which has an odor that is most disgusting and offensive.

The question as to whether natural gas will ever become a formidable rival of coal gas as an illuminant is, of course, of more practical importance to gas men than any other connected with this subject. That it can be answered in the negative, as far as the central and western portions of this State are concerned at least, would seem to be the prevailing opinion of those who have given it the most thorough consideration. It is well known that natural gas, as it issues from the ground, is inferior in illuminating power to coal gas. Whether it can be profitably enriched and its illuminating power increased remains to be seen. The dangers attending its use in dwellings are familiar to all. The absence of any odor by which to detect its presence, taken in connection with the fact that the pressure is always very great—ranging from one atmosphere to 550 pounds when confined, thus increasing the liability of leakages—causes its use to be attended with great danger from explosions. Indeed, these have been of so frequent occurrence of late that it is said a Pittsburgh daily newspaper keeps constantly standing in type, ready for insertion in every issue, the stereotyped heading and opening lines—"A terrific explosion of natural gas occurred," etc. However, this danger may be lessened, and no doubt will be, by the use of automatic valves and governors to regulate and control the pressure; by improving the pipes; and possibly by the introduction into the gas of some material to give it an odor. But there is one essential thing that the use of all these expedients will not insure—and that is a constant and permanent supply of the gas. The average length of life of a gas well is stated by one authority to be about 11 years.

In western Pennsylvania, and in different parts of Ohio, wells that a few years ago emitted a large and constant volume of gas have heaved their last sigh and expired; and when the gas ceases to flow, automatic valves and governors and low prices will not bring it to the surface again. The porous sand rock has been exhausted of its supply; and although the distillation from the shale below may still be going on, it is so slow that it may require generations, or even ages, to again "raise the holder."

Again, as far as Ohio is concerned (and this subject has been treated rather from an Ohio standpoint), the geographical distribution of this shale and sand rock is not such as to warrant the expectation that natural gas will be found to exist in any considerable quantity throughout the greater portion of her area; and it is not likely that it will ever be profitable to conduct it in pipes from more prolific regions without her borders.

In the western part of Pennsylvania natural gas is so abundant and so cheap (being now delivered at from 12½ to 30 cents per thousand), that it there may become a competitor of coal gas as an illuminant. In fact, in many parts of that section, it has already driven coal gas from the field; and future discoveries of natural gas, and further improvements in the methods of its distribution, may enable it to rival and supplant coal gas in other localities. For heating purposes natural gas, owing to its greater calorific power, is much superior to coal gas. For burning brick or lime, and melting glass, iron and steel, there is no other fuel to equal it. For manufacturing purposes, and for heating dwellings, natural gas, where it is abundant, bids fair to become, for a while at least, not only a supplanter of coal gas, but also a strong competitor of coal itself.

After all, the principal ground for hope and encouragement to those who are likely to suffer from the encroachments of natural gas, in the fields of both illuminating and heating, is the uncertainty of a constant and permanent supply.

*Discussion.*

The President called upon Mr. McMillin to give his experience as to what had been done in boring for natural gas at Ironton.

Mr. McMillin—Natural gas was found at Ironton, though not in quantity to possess any economic value. I take issue with Mr. Butterworth in regard to his statement that the overlying porous sandstone formation is comparatively insignificant in the southern portion of this State. At Ironton it was found to have a thickness of 108 feet. This reservoir is much thicker there than at many other points in Ohio, and the shale was also very heavy; but after reaching the shale they had very little hope of getting gas, as it is generally in the overlying sandstone that the gas is found. The well at Findlay, Ohio, is an anomaly. There is less than half, perhaps not more than two-fifths of the territory in this State where the Huron shale is found, and in not more than one-quarter of the State is the Huron shale sufficiently covered with an overlying strata to prevent the gases from escaping. If natural gas can be obtained at depths below the Huron shale, then even Cincinnati is in danger. I learn that it was in the Cincinnati limestone group that they tapped the gas vein at Findlay. Heretofore drillers have not been successful in discovering natural gas in those shales; and geologists consider it rather remarkable it should be found in the Findlay instance. Yet it seems to me no real cause for such surprise exists, as the exploiters hitherto had not been drilling to such depths. The Findlay region has not been known as favorable to the discovery of an oil or a salt bearing strata, as is the case in other parts of Ohio and Pennsylvania where bore-holes for oil or salt wells are frequently drilled, and where perhaps to ten holes drilled gas is found but once. Heretofore geologists have considered a man as quite stupid who would drill in the Niagara limestone, or even anywhere below the Huron shale, in the expectation of striking a gas vein. Two flowing wells have been found at Findlay, and the estimated outsend from each is placed at about 250,000 cubic feet per day—I could readily believe the product of them is much in excess of that estimate. The wells are probably one and a half miles apart, and in sinking the drills passed through a shale between 500 and 600 feet thick. I know of no reason why natural gas should not be found in other regions of that strata, which extends all over Ohio. The Findlay gas carries less than one per cent. of carbonic acid. It can, for vileness of odor, compete with, and even excel in that respect, the foulest sample of unpurified coal gas; and one most striking circumstance brought to my notice was developed through the removal of an ordinary one-inch

L-shaped branch. Its inside was found lined all over with pure flower of sulphur. Now I have often heard the meter man laughed at for saying somebody's gas was bad—that it deposited sulphur in the meter. The laugh is now on the other side, I think. Sulphuretted hydrogen may be decomposed—it was decomposed in that instance. At Findlay the street lamps are kept lighted day and night. The natural gas is used for lighting, heating and cooking. I did not test its illuminating power. I am told it shows only about one-half per cent. of illuminants; yet, consumed in an argand burner, it gives a very fair sort of light. The first gas vein was struck at a depth of 1,092 feet below the surface; the second bore-hole made contact at 1,200 feet. I think, however, they were really at about the same level, owing to difference in surface height of points at which boring was commenced. The Findlay Gas Company folks, from sinking that second drill, rather think they have struck an elephant; for should they charge more than 25 cents per thousand, many consumers could afford to put down drills on their own account. If they sell all their gas output at 25 cents per 1,000 they would receive only $62 per day. They were rather in a quandary as to whether they had any use for the second well after they had bored it. I do not know what conclusion they have arrived at by this time; and most assuredly they will not be able to sell the gas for a much longer period unless they purify it—although they were sending it out in a crude state up to a few days ago.

Mr. Thompson—I would like to ask Mr. McMillin to explain why it is that natural gas only has a good illuminating value when burned through an argand burner? Judging from the view I had of it at Liverpool, Ohio, it has an abominable appearance when consumed in an ordinary burner.

Mr. McMillin—I think if the Findlay gas were purified the consumers would be pretty well satisfied with it. Using an argand burner, and with gas costing but 25 cents, they could afford to burn two lights instead of one. This gas does not seem to be a producer of very intense heat. Mr. Butterworth states that it far exceeds coal gas in its calorific power; now that may be true when speaking of quantity; but it is the very reverse of true, so far as intensity is concerned. If you burn it through an argand lamp, and thus exclude the cold air from the hot air passing through the chimney, the temperature becomes sufficiently high to produce the very fair light given by it under that method of burning it. I am not quite sure but this would be a situation where the water gas man might take hold and be of some real use to the world—put two poor gases together, and thus possibly make one good one as a result of the union.

Mr. Hamlin—I wish to ask Mr. McMillin whether ordinary street mains will retain the natural gas? At the time of the Pittsburgh explosions it was explained that iron was too porous to resist the "searching" qualities of the natural gas product.

Mr. McMillin—This I should say, speaking from a purely theoretical standpoint, is true; but practically it is not. Cast iron pipe of half-inch thickness will retain it. Explosions are frequent, but I think they are results of the loose manner in which the pipes were laid, and consequently ought not to be attributed to the "searching" nature of the gas. It ought not to leak, under the same pressure, as freely as coal gas would, because its specific gravity is greater. I do not think purveyors of natural gas would experience any trouble at all, working under pressures similar to those carried by us; but, on the contrary, they would then have a great deal less leakage than we experience with our coal gas.

Mr. Salter stated that the Hemingray Glass Company, at Covington, Ky., were boring for gas. They had struck two or three veins at varying depths, and were going still deeper. He understood they had secured a flow equal to about 3,000 feet. He had seen it burning as it issued from the mouth of tube at well, but had not perceived it burning under ordinary everyday lighting conditions. One of the Messrs. Hemingray told him that the first vein was struck at 350 feet; the second at 500 feet; and the third at about 750 feet depth. They were now down to about 1,000 feet without having encountered an additional vein. They proposed sinking to a depth of 2,500 feet.

The discussion thereupon terminated.

[To be continued.]

## The New Gasholders Built to the Order of "The Gas Light and Coke Company" at the Horseferry Road Station.

The London *Journal* publishes the following particulars in regard to the latest additions made to the storage plant of the above-named Company's works. The article points out that in the course of his report on the construction and carbonizing departments of The Gas Light and Coke Company during the past half year Mr. G. C. Trewby stated that since his appointment, in March last year, the only additions of importance to the Company's manufacturing plant were some purifiers at Nine Elms, and "the erection of two large gasholders, just completed and brought into successful operation on the Company's vacant land at Horseferry Road."

These holders are telescopic (two-lift), and have each an available capacity of 1,900,000 cubic feet. The total height of the holders is 67 ft. 9 in. from the under side of the curb to the top of the curb of the upper holder. The lower lift is 192 ft. 8 in. diameter by 35 ft. high; and the upper lift 190 ft. diameter by 34 ft. 3 in. high. The crown has a rise of 8 ft. at the center from the curb line. Both holders and framing are composed essentially of wrought iron, cast iron being only employed for the ornamental work and bases of the standards. The larger rollers are of cast steel, and the smaller ones formed from wrought iron. The specified test of the wrought iron was 22 tons per square inch, with no permanent elongation up to 10 tons per square inch.

The outer lifts of the holders have a bottom curb of two 7 in. by $\frac{5}{8}$ in. flats, placed horizontally 12 inches apart, and strengthened by two angles 3½ in. by 3½ in. by ½ in. The grip is formed by a horizontal plate 16 in. by $\frac{5}{8}$ in., with two angles 3 in. by 3 in. by $\frac{5}{8}$ in., connecting it to the ½ in. thick pendant plate of the grip and to the side of the holder respectively; the grip and also the cup of the inner vessel being 18 in. deep and 10½ in. wide. On the outer edge of the grip the top plate overhangs, and covers the top of the 20 vertical stays, which are each composed of two 7 in. by $\frac{5}{8}$ in. flats, connected to the sides by angle irons. On the inside of the holder, opposite each vertical stay, a 12 in. by $\frac{5}{8}$ in. flat bar runs the whole height of the side, forming a roller path. The top and bottom rows of sheets in the outer lift are ½ in. thick. A vertical plate opposite each vertical stay is 1 ft. 6 in. wide and ½ in. thick, the remaining sheets being ½ in. thick. Two 6 in. by $\frac{5}{8}$ in. flat iron belts are carried horizontally round the holder inside, connected to the plates at the back of the posts on either side of the roller paths.

The inner lifts of the holders have a cup formed by a 16 in. by $\frac{5}{8}$ in. bottom plate, with angles and ½ in. vertical plate as for the grip. The 16 in. plate extends on the inside of the holder, and forms a connection with the 20 vertical stays, which are of a girder section, with 18 in. by ½ in. web, and four angles; the two inner ones being 4 in. by 3 in. by $\frac{5}{8}$ in., and the outer ones 3 in. by 3 in. by ½ in. The top curbs are curved in section to a radius of 3 ft., and consist of two $\frac{5}{8}$ in. plates, each 2 ft. wide, having planed edges; the butt joints being covered on both sides, and double riveted. The vertical posts before mentioned are fitted under the curb plates, and connected by lattice trussing 10 ft. deep to the main rafters.

The crowns are each trussed by ten main rafters 3 ft. 6 in. deep at the curbs, reduced to 3 ft. at the center, having four flange angles 4 in. by 5 in. by $\frac{5}{8}$ in., and lattices 4 in. by $\frac{5}{8}$ in. Six of these rafters are connected at the center, the others being secured between two crown plates 9 ft. in diameter and ½ in. thick. Between the main rafters is a ring of concentric purlins, of a similar section to the rafters, but with a ½ in. web instead of lattice bars. The ten secondary rafters have flange angles 4 in. by 4 in. by $\frac{5}{8}$ in., and lattices 4 in. by $\frac{5}{8}$ in. These extend from the curbs to the concentric purlin girders mentioned above. Below the main and secondary rafters are three rows of concentric purlin lattice girders, of 3 in. by 3 in. by 5-16ths. in. angle flanges and 4½ in. by $\frac{5}{8}$ in. lattice bars, and these carry the T-iron bracket bars which are placed to support the sheets at distances of about 8 ft. radially. Immediately below the lattice trussing to the main rafters the vertical stays are connected by two rings of 5 in. by $\frac{5}{8}$ in. flat iron 1 ft. 2 in. apart, braced by flat bars, which give additional stiffness to the sides. The top and bottom rows of sheeting next to the cup and curb are 2 ft. 8 in. wide by ½ in. thick. With the exception of the 18 in. by ½ in. vertical plates at the back of the posts, the remaining side sheets are all ½ in. thick. The rows of plates adjoining the top curb and the crown plates, and those on the main purlins, are 3 ft. 2 in. wide by ½ in. The other crown sheets are all ½ in. thick. All the crown plates exceeding ½ in. thick are riveted to rafters and ring purlins; the others are only supported by, not attached to, the trussing.

The top carriages on both lifts have cast steel turned and bored pulleys, which work in wrought iron carriages. The axles are fitted with a special arrangement by means of which they can be adjusted exactly to the guide rails, and are then secured by a screw and nuts, which prevent any lateral movement, and dispense with the usual slotted holes and loose packings. The carriages on the cup and the bottom curb have solid wrought iron rollers turned and bored. A handrail 3 ft. 6 in. high is fixed round the top curb of each holder.

The guide framing to each holder consists of 20 wrought iron standards, each 68 ft. 6 in. high from the base stone to the under side of the top girders, and two tiers of girders. The standards are rectangular in section, formed of four 6 in. by 6 in. by $\frac{5}{8}$ in. angle irons and two 6 in. by 3 in. by ½ in. tees, with T-iron diagonals 5 in. by 5 in. by ½ in. At the junction of the diagonals they are strengthened by a solid angle frame 4 in. by 4 in. by ½ in. At the base the standards are 6 ft. by 3 ft. 3 in., tapering to 3 ft. by 3 ft. 3 in. at the top. The base plate is cast iron, 6 ft. 9 in. by 4 ft. 9 in. by 1 ft. 4 in. deep, faced on the upper surface, to which the standards are bolted. A steel rail, 80 lbs. per yard, with fished joints, forms the guide for the rollers. The top of each standard has an ornamental cast iron finial; and seven moulded

panels are fixed on each of them at intervals of the height. The girders (of which there are two tiers) are of lattice work, 3 ft. deep, consisting of four flange angles 5 in. by 4 in. by ½ in., with 5 in. by ½ in. lattices. The angles are turned round and welded at the ends, forming solid frames. The framing is strengthened by two tiers of diagonal bracing between each pair of standards. The whole of the connections of the girders and standards are riveted. Each standard is secured by four holding-down bolts 2¼ in. diameter and 10 ft. long, with 12 in. by ½ in. holding-down plates built into the tank piers.

Inlet and outlet pipes and boxes, 24 in. and 30 in. diameter respectively, of wrought iron, are fixed in each tank. These were all tested by hydraulic pressure to 50 lbs. per square inch at the works. The holders were proved with air; and, after sealing the inlet and outlet pipes with water, remained inflated for three days without movement, allowance being made for differences of temperature and barometrical pressure.

A special feature in connection with the erection of the guide framing arose from the fact that, owing to the space outside the tanks being so limited (2 ft. only at the back of the standard bases), no guys could be used outside the tank for the hoisting tackle. This difficulty was ove come by working the sheer-legs inside and from the bottom of the tank, making them, of course, high enough to overtop the top of the standards, with sufficient margin for the lifting blocks. At about two-thirds of the height of the legs a back leg or strut was connected to them and carried to the dumpling in the tank, wire guy ropes being taken from the top of the legs to the opposite side of the tank; the whole thus forming a perfectly steady hoist. The hoisting itself was done by a steam winch, also working inside the tank, and by this means a column and the connecting girders could be hoisted in a day.

The total weight of all wrought iron and steel in the two holders, including the inlet and outlet pipes and holding-down bolts, was 1,150 tons, the cast iron being 180 tons. The holders, when fully inflated with gas, give a pressure of 7 inches of water.

The time originally specified for the completion of the holders was: No. 1, by October 1, 1884; No. 2, by October 1, 1885. But both holders were completed by November 15, 1884. The contract price for each holder was £14,492 8s. The whole of the work was carried out and fixed by the Horseley Company, Limited, of Tipton, from the designs and under the superintendence of the Company's Engineer, Mr. Alfred Kitt, Assoc. M. Inst. C.E.

## Improvement of the Locomotive Engine.

*Engineering*, in discussing the subject of the grate surface of locomotives, says the demand in American locomotive engines is still for greater steaming capacity to enable them to make time with heavier loads. Since the boiler shells are limited in practice by the gauge of railroad to 54 in. or 55 in. in diameter, while the length is determined by the length of the tubes, which do not exceed 12 ft. 6 in. in length, this has thus far limited the extent of heating surface in the boiler. But this is not the main difficulty. The fire-boxes, located between the wheels and frames, limiting the grate area, except in the Wooton form, to about 15 square feet, the fires have thus to be forced to an extraordinary degree, the rate of combustion frequently being 120 lbs. to 140 lbs. of coal per square foot of grate per hour. The result of this state of things is a low evaporative efficiency; the American engines doing heavy work averaging not more than 5 lbs. to 6 lbs. of water to a pound of coal consumed. The only possible relief seems to be in an extension of the grate surface and the corresponding heating surface. By using slab frames, 1¼ in. thick, or by modifying the customary American design of the frames and the fire-box so as to allow the latter to extend over the frames to within an inch or so of the driving wheels, would enable the grate surface to be increased by some three or four square feet. The length of fire-box is now limited by the distance between the main and back pairs of driving wheels or the rigid wheel base of the engine, but more particularly by the distance the fireman can easily throw the coal so as to keep the grate well covered and avoid bare places for the admission of currents of cold air. This limit is for bituminous coal burners about 6 ft. If slab frames are used it then becomes necessary to underhang the springs and equalizing beam beneath the frame and fire-box, as is usual in this country. It is very evident that the grate surface of engines will have to be increased at no distant day, and it would seem as though inventive genius might profitably be employed in studying practicable means for this end. The subject is one of the most important ones relating to the improvement of the locomotive engine, and the increase of its efficiency and consequent economy of working, and is already being given serious attention.

One or Two Figures.—According to the annual report of Mr. J. H. Knowles, Superintendent Richmond (Va.) City Gas Works, that corporation owns a conduit system 53 miles in extent. The total number of meters set is 4,630.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

To Take Charge of the El Paso (Texas) Plant.—Mr. M. L. Hickey, formerly in charge at Dallas, Texas, has assumed the duties of Manager and Superintendent at the works of the El Paso Gas, Coal and Coke Company. Mr. H. S. Potts was his predecessor at El Paso.

Removing Hard Tar from Hydraulic, and Freeing Dip and Ascension Pipes.—Mr. B. F. Leete, Secretary of the Reno (Nevada) Gas Company, says that the following practice, adopted with a view to the dislodgment of hard tarry accumulations in hydraulic, and keeping dip and ascension pipes free from obstructive deposits, has been found to answer every desired purpose: Once a month the stopple of dip pipe is removed, and a jet of steam is directed into bottom of hydraulic main, by dropping steam pipe down through dip pipe. The steam is allowed to enter until tar in main is brought to boiling point, when it is easily discharged, and hydraulic and dips are rendered perfectly clear.

He Came to Grief.—A person named Chas. F. Lyon, 30 years of age, and a resident of Brooklyn, N. Y., has for quite a while been in the employment of the Mutual Gas Light Company, of this city, as a bookkeeper. Lyon had charge of the accounts and made out the bills for a certain section of the Mutual Company's output in the down-town business district of the metropolis. The collector for the district was a man named O'Brien. With the commencement of 1885 O'Brien resigned his berth, and a notice that a new collector would present the monthly statements was mailed to the consumers. Lyon, seeing his opportunity, made out a number of accounts and handed them to as many of the consumers as he could call upon within the space of two days. During that period he managed to collect the sum of $1,100, and with that amount safe in his pockets he resigned from the company's service, alleging as cause therefor that he had been hastily summoned to make a visit to San Francisco. He could not have been well out of New York city before his peculations were discovered, and Mr. Kennedy speedily reported the facts in the case to the officials at Police Headquarters. Inspector Byrnes had Lyon's description telegraphed to the police of every large city in the West and South. The fugitive was finally discovered at Raleigh, N. C., where he attracted attention through his lavish outlay of money. The Raleigh authorities returned him to New York, and upon his arrival here he was consigned to the care of Warden Finn. The specific charge made against Lyon was that of fraudulently obtaining from Messrs. Powell and Campbell, wholesale shoe dealers, doing business at Church and Duane streets, the sum of $50.25 in settlement of their gas bill. Lyon will have a chance now to earn much more than that sum for the State through his labors in the shoe shops of Sing Sing. When arrested at Raleigh he had $500 left.

East End Gas Company (Pittsburgh, Pa.) Reduces Price of Gas.—Mr. W. H. Denniston, Secretary of the East End Gas Company, under date of March 31st, has published a notice to his consumers that from and after May 1st, 1885, the price of gas to users of over 1,000 cubic feet per month will be at the rate of $2 per M., with a 20 per cent. discount granted on the face of all accounts settled within ten days from the date of their presentation. This is a virtual fixing of the price at $1.60 per 1,000. The East End is a suburban company, and possesses and operates no less than 32 miles of mains, a fact that shows distribution charges must be rather heavy items. The Union Railway Depot at Pittsburgh proper probably consumes more gas than that absorbed by any twenty of the East End's patrons. Looked at in this light the $1.60 figure is just as reasonable as the seemingly lower figure charged by its nearer neighbors operating within the business limits of the "Smoky City." Mr. Denniston proposes to deal with those who are inclined to dispute the correctness of the meter's figures in the following manner, as per the words of the circular distributed to the consumers: "If there is any dissatisfaction about bills, it must be reported to the company's office at once so that the quantity registered may be inquired into. If the registry is correct and you still think the bill too large, or that the meter is inaccurate, you will at once notify the official gas inspector, as per his rules. If you want the benefit of the 20 per cent. off, you will in any event pay before the tenth day has expired; but if the gas inspector condemns the meter, the company will refund any overcharge, put in a new meter, and pay all the expenses incurred in the testing. If this regulation does not meet your approval will expect your order to remove meter; we will do so at once, but with reluctance and regret. Hereafter the meter must determine all difference as to gas accounts, and no personal appeals will be considered at the office of the company. This latter plan has been tried, and under its working it has been impossible to arrive at satisfactory decision between consumer and company. If the meter, when shown to be correct, registers a certain quantity as having passed through it, the company wants to be paid for that quantity or cease furnishing gas. The reduction in price, it is hoped, will

will warrant a still further reduction in the future." Well said, Brother Denniston; and the only parties squirming beneath the effect of reduced gas prices are the "professors" and erratic travelers who have carbonic oxide death-traps "for sale cheap."

AN ADDITIONAL LIST OF VICTIMS.—The following deaths are to be attributed to the venenose nature of carbonic oxide: Herman Ahrens (a man about 26 years of age) has been boarding for some time past at the Bull's Head Hotel, located at corner of Third avenue and Twenty-fourth street this city. Before retiring on night of Saturday, April 4th, it is said that he blew out the gas. The following morning he was found dead in his bed. The gas was escaping through a partly turned off burner.

CASE NO. 2.—A "special" to the newspapers, dated Wilkes-Barre, Pa., April 5th, says that a large gas pipe running under sidewalk in front of Henry C. Engelke's house, on South River street, burst, and the gas escaped in large quantities into the cellar and thence through the house. There were in the house at the time Mr. Engelke, his wife and daughter, also a servant named Kate Schlessinger. All were overcome before they could give an alarm, and all would have perished were it not for a neighbor, a Mrs. Dietrick, who discovered their condition, and at once summoned medical aid. Drs. Mayer and Miner put forth their utmost efforts to rouse the sufferers from their death-like condition, and soon had the satisfaction of restoring Mr. Engelke and daughter to consciousness. Mrs. Engelke hovered between life and death, and it is as yet an even thing whether or not her case will terminate fatally. The servant girl never regained consciousness, and died in about an hour from time of discovery. There being only two doctors in attendance upon the four patients, it is fair to presume that the servant was the last of the sufferers to receive medical assistance. Her demise goes to show how swiftly fatal CO is in the performance of its veneficial potency. All the despatches in relation to the Wilkes-Barre case explained that water gas was much more dangerous than coal gas, and that water gas only was manufactured there.

CASE NO. 3.—Francis Rodgers, probably 24 years of age, and hailing from Kansas City, Mo., on an early date in April reached Baltimore, Md., in which city he intended making a sojourn for a few days before starting for New York, it having been his intention, upon arriving at this port, to take passage for Ireland on one of the outward bound steamers. He took temporary lodgings in a Baltimore boarding-house, and on morning of April 8th was discovered in his bed in an unconscious condition. The gas burner in room had not been turned off. Two doctors labored over him for several hours, but with no beneficial effect, as the patient died on the 9th.

AMERICAN WATER WORKS ASSOCIATION.—Mr. J. H. Decker, Secretary and Treasurer of the American Water Works Association, informs us that the Fifth Annual Meeting of the Association will be held in Boston, Mass., on the 21st, 22d and 23d days of April. Headquarters will be at Youngs' Hotel. This Association was organized on the 29th day of March, 1881, initial meeting taking place at St. Louis, Mo. Mr. Decker has been unremitting in his exertions on behalf of the body; and so well have his efforts been responded to that the Society now has a total membership of 150, with a comfortable financial standing amply ensured. Mr. Decker is well known to the gas fraternity through his long and honorable connection with the Hannibal (Mo.) Gas Light Company.

A FEW OF THE CONSUMERS WHO WILL NOT HAVE THE CHICAGO WATER GAS.—As a sample of the dissatisfaction that exists amongst people who have been taking gas from the mains of the Chicago (Ills.) Consumers Gas Fuel and Light Company, but who have gone back to the old Chicago Gas Light and Coke Company, we may mention the prominent cases of the proprietors and owners of the Palmer and Madison Houses, and the *Tribune* and *Inter-Ocean* newspapers. The Palmer House managers have made a five year contract with the Chicago Company, on the basis of $1 per thousand for the consumption of '85 and '86; an additional 25 cents per thousand to be charged during '87, '88, and '89. So desperate has the Consumers' situation become that its officials were driven to the expedient of compiling a list that must contain about all the patrons possessed by the Company in the business portion of the city. The circular list starts off with the announcement, "We, the undersigned, take pleasure in assuring the public that the 'Consumers Gas Fuel and Light Company' have furnished us *for some time* a gas of a superior quality, giving entire satisfaction," etc. The italics are ours, and we are prompted to exclaim, "How long, Oh Lord; how long!" In the meantime, to show the sort of impress that Mr. Forstall is making upon the Chicagoans, it is only needed to say that the increased output of the Chicago Company, during the first 20 days of March, as compared with same days of '84, reached a total of 17,000,000 cubic feet, or at the rate of 35½ per cent. No need for "circulars" in the neighborhood of that establishment.

A NEW METHOD OF RENDERING HARMLESS THE CURRENTS FROM A HIGH TENSION DYNAMO STATION.—The only trouble with the process, though, is that the circuit is broken. The discovers in this branch of applied science were made known to fame and secured to the arms of Justice by the researches of Police Officer Cook, who happened to discover Charles Tierney and Albert A. Noll, in a yard in front of a house situated on West 17th street, this city, in the act of coiling up about 200 pounds of copper wire. The aforesaid "scientists" had, in broad daylight, climbed up the poles (belonging to the United States Electric Illuminating Company) on which are strung the "arc" light conductors that run through Gansevoort street. Altogether they managed to cut down the wire lengths that stretched between 14 poles.

THOUGHT IT WAS A JOB.—At a meeting of the Allegheny (Pa.) Streets and Sewers Committee Supt. Young, of the Allegheny Gas Company, asked that the Allegheny Heating Company be allowed to proceed on the work of laying pipes for the Gas Company. Some time ago the latter corporation was granted an ordinance permitting it to lay conduits through certain streets, and now the Heating Company (it supplies natural gas only) asks for these franchises. The Committeemen appeared disposed to infer that the Heating Company had bought the Gas Company out. Supt. Young denied the truth of the inference. The request was finally granted; but, for all that, the grantors still retained suspicions about the application. That shows the innate working of the Allegheny Councilor's mind. He did not care so much about the fact that there might be a "job" concealed in the request as he regretted the circumstance that he was not one of the "jobbers."

"INCORPORATING" THEMSELVES.—On date of April 4th the "Gas Consumers Association of the State of New York" filed a certificate of incorporation at Albany. The avowed object of the organization is to protect consumers from extortion by gas companies. 'Ere is your true circle of philanthropists who compose the Board of Trustees: Messrs. J. H. Sherwood, J. S. Schultz, W. H. Wood, T. Moss, R. H. Strebeigh, F. H. Thurber, W. D. Garrison, S. Shook, H. Cranston, H. M. Smith, F. S. Gardiner. The idea of some of these people assuming the garb of philanthropy! Motes and beams are at a discount in our day.

TURNING ON THE GAS.—Last fall the Pacific Construction Company broke ground (with a view to the erection of a gas works) at Olympia, Washington Territory. On Friday, March 27th, gas was turned on to the mains, and its appearance at the burner tips was hailed with much rejoicing. Olympia is the capital of Thurston county, and is located at the head of steam navigation on Puget Sound, about 150 miles from Pacific Ocean. Fifteen years ago Olympia had but 600 inhabitants; now it has a population sufficient to support a gas plant.

OBITUARY NOTE.—Mr. H. D. Green, the founder and chief owner of the gas and water systems supplying Portland, Oregon, died quite suddenly on evening of April 5th. The deceased gentleman was on a visit to the East, and his demise occurred at the Fifth Avenue Hotel, this city. Mr. Green was in the 58th year of his age, and was one of Oregon's wealthiest citizens.

A CHANGE IN SUPERINTENDENCY AT MONTGOMERY (ALA.) GAS WORKS.—The board of directors of Montgomery Gas Light Company have appointed Mr. Peter Young, formerly of Pittsburgh, Pa., to the Superintendency of their thriving Southern plant.

A TELEPHONE WIRE CARRIED ALONG A GAS MAIN.—The Consolidated Gas Company, New York city, is engaged on the work of connecting the holders of the Knickerbocker and Harlem stations with a 20-inch cast iron conduit. This conduit carries, close to its inner top section, a private telephone wire for maintaining oral communication between the two stations. The pipe is laid along the west side of First avenue, and its total length embraces the distance between 99th and 111th streets. An 8-inch consumers' main is laid in the same trench.

PERSONAL.—In our issue of March 2d we explained that Mr. T. A. Bates had resigned the position formerly occupied by him at the Cairo (Ills.) works. That action was taken by him so that he might take charge of the Los Angeles (Cal.) plant.

HEATING THE NEWLY-BUILT "INSURANCE EXCHANGE" AND "TRADERS' BUILDING," OF CHICAGO, ILLS., WITH GAS.—Mr. E. H. B. Twining, the enterprising Chicago agent of the Goodwin Gas Stove and Meter Company, of Philadelphia, Pa., has achieved a noteworthy victory in causing the owners of the newly-constructed and elegant office buildings (known as the Insurance Exchange and Traders' Building, both located on Pacific avenue) to employ gas heat as a method of warming the interior of the structures. In lieu of the ordinary fireplaces elegantly-designed gas grates are employed. The mountings of grates in Insurance Exchange were constructed from specially-

prepared designs, and will not be duplicated for employment in any other Chicago building. The ornamentation is, according to the *Inter-Ocean*, "rich, artistic and satisfactory." This new departure from the beaten track pursued by Chicago architects in making provision for heating office structures is well worthy of notice. Messrs. Goodwin and Twining are quite elated over the matter, and the Chicago "gas men" are also inclined to "jubilate" in regard thereto.

THE AUDIENCE LEFT IN DARKNESS.—During a recent performance of "Die Walküre," at the Stuttgart Theater, the newly-installed electric lighting appliances got out of order, and for several minutes the stage and auditorium were plunged into Egyptian (or rather "Dutch") darkness.

REDUCING PRICE OF GAS AT UTICA, N. Y.—On March 23 the directors of the Utica (N. Y.) Gas Light Company informed the consumers of that city that all consumption of gas registered on meters from March 1st would be reduced from $2.25 to $2 per 1,000. The discounts to consumers of largest quantities was fixed at 40 cents, and smallest consumption 25 cents, per thousand respectively—or net rates of $1.60 and $1.75 per thousand cubic feet.

FROM PRESENT APPEARANCES, WE THINK "NO" ANSWERS THE CONUNDRUM.—At the March (1884) meeting of the Society of Gas Lighting, Mr William Farmer read a paper* on the "Chamberlain Gas Process," and in explaining the details of same the writer withheld himself from expressing his own views as to the value of Mr. Chamberlain's claims. Mr. Farmer closed his presentation of the process with the remark, "Gentlemen, is this to be the gas of the future or not?" Since no one seems as yet to have replied to the conundrum then propounded, the writer takes to himself the liberty of replying, "No, sir; it would seem not." And the reply is based upon the outcome of certain experiments lately made at the works of the Laclede (St. Louis, Mo.) Gas Company.

ROCKLAND AND THOMASTON (ME.) GAS LIGHT COMPANY REDUCES PRICE OF GAS.—Mr. Austin M. Copp, agent of the above-named company, and acting under authority of the board of directors, issued the following to the consumers, under date of April 6th: "We take pleasure in informing the public that the price of gas has been reduced from four to three dollars per thousand cubic feet, and that to all customers who pay their bills on or before the 25th day of month in which they become due, a discount of 25 cents per thousand will be allowed. At the net price of $2.75 per M. gas is being sold at a lower price than in any other town in this State where inhabitants burn an equal quantity with that consumed here. In fact, the only places in the State where lower prices obtain are the large cities of Portland and Bangor." Superintendent Chas. T. Frost, in the same circular, offers to freely impart any desired information relative to the use of gas cookers and heaters; and explains that the company will furnish stoves and burners at first cost. The annual output of the Rockland Company reaches to a total of about three millions, and the $2.75 rate is therefore a very reasonable one. By the end of present year the excellent result of Mr. Copp's liberal policy may be trusted to manifest itself in the most convincing manner.

HE WAS TOLD TO "GO ON."—In the last number of the JOURNAL we gave some few particulars concerning a certain trip taken to Troy, N. Y., by a "wanderer" (L. H. Gibbs) who wanted a franchise, said wanderer having been accompanied by a "contractor" (B. Van Steenbergh) who claimed to have a contract for building a gas plant in a city suspiciously like unto the measure of Troy—at least so the great Goshen foundryman testified before the Gibbs-Thomas-Daly Senate combination during the now historical Morton House sessions in this city. We left Messrs. Gibbs and Van Steenbergh uttering their plaintive pleadings in the ears of the members of streets and alleys committee of Troy Council; and from the testimony that had been presented at committee's session we gave it as our opinion that Gibbs' project would "hang fire." The subsequent action of Council verified the correctness of that prediction; for Mr. Mead, of street and alleys committee, at full meeting of Council, held Thursday, April 2, reported adversely on the scheme proposed by the erratic traveler and his associates. The Council accepted the report—and again poor Gibbs "goes on," and Van Steenbergh's contract becomes woefully contracted. Sue tells us (and we are obliged to confess that he is not generally accepted as sound authority) that the cholera followed in the wake of the Wandering Jew; and, strange to say, when Gibbs got ready to test the springiness of the roads leading out of Troy, the Councilors made trouble for the Troy Gas Company in the shape of passing a resolution authorizing the city to contract with the electric lighting folks for the erection and maintenance of ten or more arc lights along the streets and roadways—location and situation of same being specified. Price of each arc to be 45 cents per night. Councilman Cridge made a determined effort to prevent the scheme from succeeding, but all to no purpose, even though he did point out that the tax rolls would have to be greatly increased in consequence of the difference in cost between "arc" lights and gas lamps. The resolution was carried by a vote of 17 for to 7 against. [Later news conveys the information that the electric scheme may yet be defeated.]

* See JOURNAL, issue April 2d, 1884.

THE NASSAU COMPANY'S NEW PLANT.—The Nassau Company's (Brooklyn, N. Y.) new holder is to be located on Rutledge street, 100 feet west of Wyth avenue. The tank is to be 152'6" in diameter, and 33 feet deep, as learned upon inquiry at Department of Buildings. The estimated cost of excavation, tank walls, etc., together with monies to be expended in erecting boiler and valve houses, is placed at $67,400. If memory may be relied upon the surface ground at that point is less than ten feet above tide-water mark.

## Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

### The "Knights of Labor" Speak Their Mind.

PHILADELPHIA, PA., March 29, 1885.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In your issue of March 16th appeared an article the terms of which we think unjustly reflect upon the former employees of the Goodwin Manufacturing Company, of this city. According to that view of the case we request you, in the interest of fairness and justice, to publish this statement.

The plain facts in this matter are the following: After remaining idle for about nine days, at commencement of present year, we received notice to resume work, and accordingly reported at the shop. As each employee was allotted his complement he also received a price list fixing the rate to be paid for the several styles of work to be done, and as the slip was handed him the admonition to "keep the prices to himself" was also administered. A week's time elapsed before all the men had received notice of the several rates to be paid. When the reduced scale became generally known the men quite naturally determined to resist a change—from the lowest prices paid by any other meter making firm in this city—to such an unjust schedule.

This action of the men was resolved upon—first; because the newly-adjusted prices were manifestly unfair. Second; there was no real necessity for the reduction, and this statement is borne out and proved by the hasty action taken by the Goodwin Company in restoring the rates when they found their employees unwilling to submit to the "docking" process. Third; the manner in which the reduction was offered proved that the company's position was unwarranted and unjustly assumed, as they hoped that, owing to the attempted reduction of the men *in detail*, there would be no concerted resistance offered, and felt they could easily coerce individuals.

We assert that resistance to oppression in any form or shape is just, and cannot, through any process of reasoning, be construed in the light of dictation as to the "running" of an employer's business. We claim that the fixing of our rates of pay is a question in which we are interested; and as far as this may be a part of an employer's business, we have a *right* to a voice in its adjustment.

We claim the right (one which appears to be conceded to capital) to associate or combine for our advancement or benefit; and, also, that the reward which labor secures directly interests all who work in our (as well as in any other) line of industry. We fail, then, to see how a committee from our company, or organization, should not be competent to act for us in the capacity of arbitrators with a meter manufacturing company or organization.

The refusal on the part of that company to treat with us, and insisting that the men shall apply in detail for work, is but a repetition of the former methods adopted in the attempt to enforce the reduction.

As to the law of supply and demand spoken of by yourself, in the article alluded to, we submit that it does not apply to the case in question. No reduction of force was contemplated; and the law quoted did not demand a necessitated reduction, as admitted by the subsequent action of the Goodwin Company.

We, as wage-earners, have a sufficient knowledge of such a law, and propose, by all honorable means, to regulate, as far as possible, its operations.

CHAS. ATHERTON,
JOS. F. FEENEY,
GEO HOBBELL, Sr., } Committee.
EDWARD CLAYTON,
EDWARD MAGUIRE.

[The "bold knight" who penned the above screed did not have time probably to append any of the forms generally adopted at the closing of a correspondence. Hence we are obliged to insert the communication bereft of the formal winding up that varies so greatly between the extremes of "Fondly yours," in the case of warm friendship, to that of the irate party, who, after conveying the information that he is about to sue you, precedes his signature with, "I am, sir, etc." Now, Messrs. Knights, the JOURNAL has no good reason to take back a single word that appeared in its columns of March 16th, and, furthermore, it does not. Should the Goodwin Manufacturing Company see fit to make any reply to the above-given "arguments" of the "regulators," an opportunity will be so afforded in our columns, and then we will consider the matter as at an end.]

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E
Manager—C. E. SANDERSON.

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THURSDAY, APRIL 16, 1885.

## The Market for Gas Securities.

The depression in Consolidated, noted at time of last writing, has ruled throughout the fortnight. Dealings were on a smaller scale, the footing of transactions showing that up to close on Saturday, April 11th, 1833 shares had been disposed of on Stock Exchange. The price ranged between the extremes of 85 and 82½, bulk of transfers being made in neighborhood of 84. The bid price at opening to-day (Tuesday, April 14th) was 83, sellers holding out for 84. The Commission measure will have a hearing in Assembly at Albany this afternoon. Present advices point to higher prices for Consolidated before end of month, and we are inclined to think this would be a good time to purchase. Mutual paid a quarterly dividend of 2½ per cent. on April 10th. Equitable is strong, and it is asserted that the Company will pay a dividend on or before June 1st. It figures this year as a bidder for street lighting, offering to light city lamps at rate of $12 per annum. Should it get an award the managers would not add much to their surplus account at the proposed price. Baltimore Con. is weak and lower; it is said the Chesapeake opposition corporation means business. Fulton Municipal (Brooklyn) pays a dividend of 3 per cent. on April 16th. Washington (D. C.) is up to 212½; New Haven (Conn.) is also held at advancing figures.

## Gas Stocks.

**Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,**

16 WALL ST., NEW YORK CITY.

APRIL 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

| | Capital. | Par. | Bid | Asked |
|---|---|---|---|---|
| Consolidated | $35,430,000 | 100 | 83 | 84 |
| Central | 440,000 | 50 | 60 | — |
| " Scrip | 220,000 | — | 47 | 57 |
| Equitable | 2,000,000 | 100 | 107 | 109 |
| " Bonds | 1,000,000 | — | 106 | 108 |
| Harlem, Bonds | 170,000 | — | — | — |
| Metropolitan, Bonds | 658,000 | — | 112 | 113 |
| Mutual | 3,500,000 | 100 | 124 | 125x |
| " Bonds | 1,500,000 | 1000 | 104 | 106 |
| Municipal, Bonds | 750,000 | | 107 | 110 |
| Northern | 125,000 | 50 | — | 80 |
| " Scrip | 108,000 | | | |
| Gas Co's of Brooklyn. | | | | |
| Brooklyn | 2,000,000 | 25 | 131 | 133 |
| Citizens | 1,200,000 | 20 | 84 | 86 |
| " S. F. Bonds | 320,000 | 1000 | 106 | 110 |
| Fulton Municipal | 3,000,000 | 100 | 147½ | 149x |
| " Bonds | 300,000 | | 104 | 108 |
| Peoples | 1,000,000 | 10 | 79 | 80 |
| " Bonds | 290,000 | — | 105 | 110 |
| " " | 250,000 | — | 90 | 95 |
| Metropolitan | 1,000,000 | 100 | 96 | — |
| Nassau | 1,000,000 | 25 | 121 | 123 |
| " Ctfs | 700,000 | 1000 | 92 | 94 |
| Williamsburgh | 1,000,000 | 50 | 132 | 135 |
| " Bonds | 1,000,000 | — | 106 | 108 |
| Richmond Co., S. I. | 300,000 | 50 | 64 | 75 |
| " Bonds | 40,000 | — | — | — |
| Out of Town Gas Companies. | | | | |
| Buffalo Mutual, N. Y. | 750,000 | 100 | 80 | 85 |
| " Bonds | 200,000 | 1000 | 95 | 100 |
| Citizens, Newark | 918,000 | 50 | 103 | 115 |
| " " Bonds | 124,000 | — | 105 | 110 |
| Chicago Gas Co., Ills | 5,000,0000 | 25 | 128 | 132 |
| Peoples G. L. & C. Co., Chicago, Ills | | | 8 | 12 |
| Cincinnati G. & C. Co. | | | 180 | 182 |
| Consolidated, Balt. | 6,000,000 | 100 | 54¾ | 55 |
| " Bonds | 3,600,000 | | 107 | 107½ |
| Central, S. F., Cal. | | | — | 58 |
| Capital, Sacramento, Cal. | | | 56 | — |
| Hartford, Conn | 750,000 | 25 | 123 | 129 |
| Jersey City | 750,000 | 20 | 145 | — |
| Laclede, St. Louis, Mo. | 1,600,000 | 100 | 88 | — |
| Louisville, Ky | 1,500,000 | 50 | 95 | 100 |
| Montreal, Canada | 2,000,000 | 100 | 181 | 182½ |
| New Haven, Conn | | 25 | 166 | 170 |
| Oakland, Cal. | | | 29 | 30 |
| Peoples, Jersey City | | — | 45 | 50 |
| " " Bonds | | | — | — |
| Paterson, N. J. | | 25 | 90 | — |
| Rochester, N. Y. | | 50 | 75 | 80 |
| Washington, D. C. | 2,000,000 | 20 | 212½ | — |
| Wilmington, Del. | | 50 | 199 | 210 |
| Yonkers | | 50 | 90 | 92 |
| St. Louis, Missouri | 600,000 | 50 | — | — |
| San Francisco Gas Co. San Francisco, Cal. | | | 56¾ | 57½ |
| Havana (Cuba) Gas Co. | 3,000,000 | 100 | 8 | — |
| " Bonds | 550,000 | | | |

## Advertisers Index.


**GAS ENGINEERS.** Page

Jos. R. Thomas, New York City ... 218
Wm. Henry White, New York City ... 218

**GAS WORKS APPARATUS AND CONSTRUCTION.**

James R. Floyd, New York City ... 219
T. F. Rowland, Greenpoint, L. I. ... 219
Deily & Fowler, Phila., Pa. ... 219
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 219
Stacey Mfg. Co., Cincinnati, Ohio ... 219
Bartlett, Hayward & Co., Baltimore, Md. ... 219
Morris, Tasker & Co., Limited, Phila., Pa. ... 218
Davis & Fernum Mfg. Co., Waltham, Mass. ... 184
Tanner & Delaney Engine Co, Richmond, Va. ... 218
R. D. Wood & Co., Phila., Pa. ... 218
Southwark Foundry and Machine Co., Philadelphia, Pa. ... 218

**GAS AND WATER PIPES.**

A. H. McNeal, Burlington, N. J. ... 216
Gloucester Iron Works, Phila., Pa. ... 216
Warren Foundry and Machine Co., Phillipsburgh, N. J. ... 216
Mellert Foundry and Machine Co., Reading, Pa. ... 216
Cincinnati and Newport Iron and Pipe Co., Newport, Ky. ... 216

**PIPE JOINTS.**

Pancoast & Maule, Philadelphia, Pa ... 212
Rolistone Machine Company, Fitchburg, Mass. ... 212

**SCRUBBERS AND CONDENSERS.**

G. Shepard Page, New York City ... 217

**REGENERATOR FURNACES.**

Charles F. Dieterich, Baltimore, Md. ... 188

**GAS ENGINES.**

Schleicher, Schumm & Co., Phila., Pa. ... 224
Continental Gas Engine Co. New York City. ... 220

**RETORTS AND FIRE BRICK.**

J. H. Gautier & Co., Jersey City, N. J. ... 214
B. Kreischer & Sons, New York City ... 214
Adam Weber, New York City ... 214
Laclede Fire Brick Works, St. Louis, Mo. ... 214
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y. ... 214
Borgner & O'Brien, Phila., Pa. ... 214
William Gardner & Son, Pittsburgh, Pa. ... 214
Henry Maurer, New York City ... 214
Chicago Retort and Fire Brick Works, Chicago, Ills. ... 214
Baltimore Retort and Fire Brick Co., Baltimore, Md. ... 214
Standard Gas Retort and Fire Brick Co., Ironton, Ohio. ... 214
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo. ... 214
Cincinnati Gas Retort & Fire Brick Co., Cincinnati, O. ... 214

**GAS STOVES.**

American Meter Co., New York and Philadelphia. ... 215
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa. ... 196

**VALVES.**

Ludlow Valve Manufacturing Co., Troy, N. Y. ... 216
John McLean, New York City ... 216

**GAS METERS.**

Harris, Griffin & Co., Phila., Pa. ... 222
American Meter Co., New York and Philadelphia. ... 223
The Goodwin Gas Stove and Meter Co., Phila. Pa. ... 223
Helme & McIlhenny, Phila., Pa. ... 223
Maryland Meter and Mfg. Co., Baltimore, Md. ... 222
D. McDonald & Co. Albany, N. Y. ... 223
Nathaniel Tufts, Boston, Mass. ... 222

**EXHAUSTERS.**

P. H. & F. M. Roots, Connersville, Ind. ... 213
Smith & Sayre Manufacturing Co., New York City. ... 218
Wilbraham Bros., Philadelphia, Pa. ... 220

**GAS COALS.**

Penn Gas Coal Co., Phila., Pa. ... 221
Perkins & Co., New York City ... 220
Newburgh Orrel Coal Co., Baltimore Md ... 221
Despard Coal Co., Baltimore, Md. ... 221
Chesapeake and Ohio R.R. Coal Agency, N. Y. City. ... 221
Westmoreland Coal Company, Phila., Pa. ... 221

**GAS LAMPS.**

Siemens Regenerative Gas Lamp Co., Philadelphia, Pa. ... 217
G. Shepard Page, New York City ... 221

**GAS KILNS AND OVENS.**

Thompson Gas Kiln and Oven Co., New York City ... 213

**PURIFIER SCREENS.**

John Calot, Lawrence, Mass. ... 212

**STREET LAMPS.**

J. G. Miner, Morrisania, New York City ... 212
Bartlett Street Lamp Mf'g Co., New York City ... 213

**BURNERS.**

G. Gefroner, Phila., Pa. ... 218

**PURIFYING MATERIAL.**

Connelly & Co., New York City ... 212

**STEAM BLOWER FOR BURNING BREESE.**

H. E. Parson, New York City ... 184

**PIPE COVERINGS.**

Chalmers-Spence Company, N. Y. City. ... 212

**GAS FIXTURES.**

Mitchell, Vance & Co., New York City. ... 212

**STEAM ENGINES.**

Westinghouse Machine Co., Pittsburgh, Pa. ... 221

**STEAM PUMPS.**

A. S. Cameron Steam Pump Works, N Y. City. ... 213

**HYDRAULIC ELEVATOR.**

Lane & Bodley Company, Cincinnati, Ohio. ... 213

**SHAFTING, PULLEYS, ETC.**

A. & F. Brown, New York City. ... 212

**HYDRAULIC MAIN.**

A. E. Boardman, Macon, Ga. ... 213


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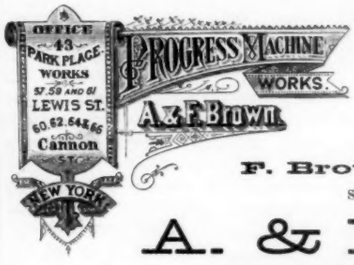


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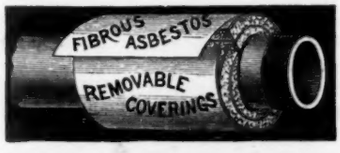


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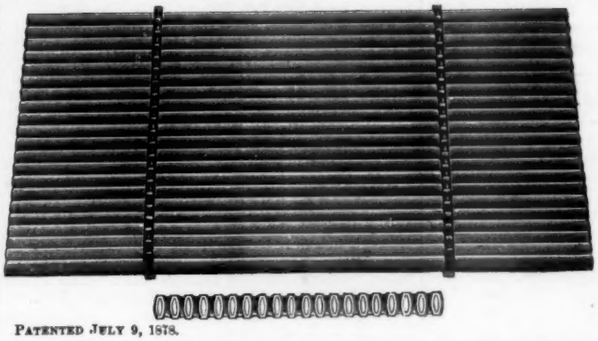

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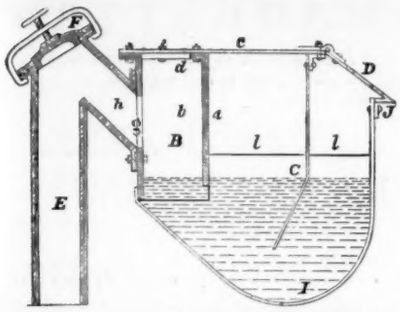


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For description, see AM. GAS LIGHT JOURNAL of Feb. 2, 1884.
For terms, apply to

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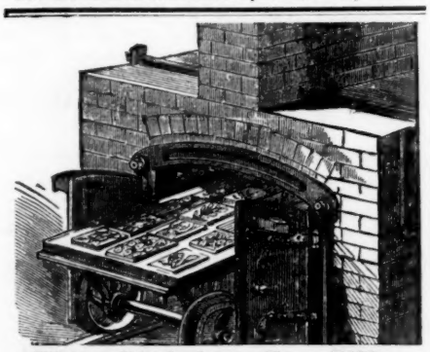

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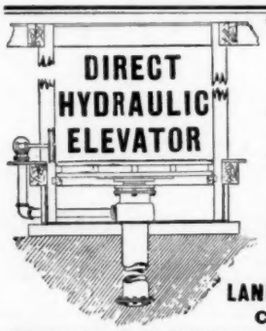


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PIPE FITTINGS, & ALL FIXTURES FOR EXHAUSTER ROOMS.

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WITH ENGINE ON SAME BED PLATE, OR WITHOUT.

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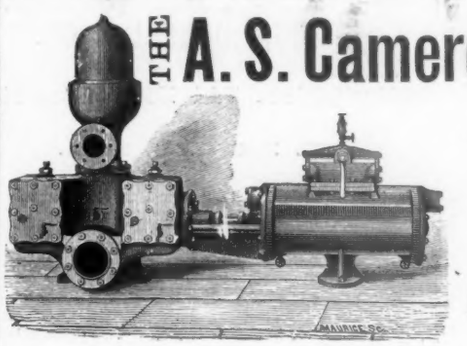

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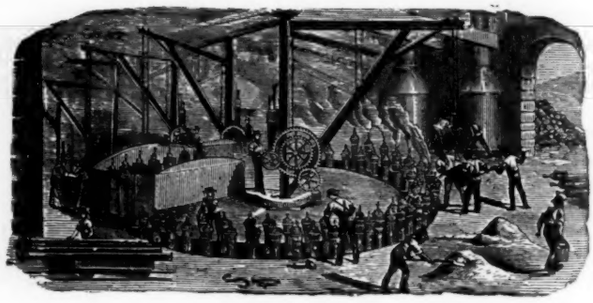

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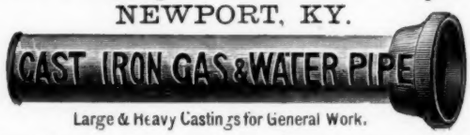


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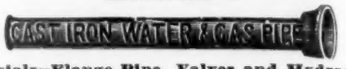


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Hydraulic Main Dip Regulators, also Check Valves, Foot Valves, Yard-wash and Fire Hydrants. Send for Circulars.

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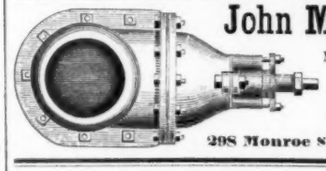

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**Advantages of the Strap File.**

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Price, $1.25. Sent either by express or mail, as directed. By mail the postage will be 20 cents, which will be added to the price of the Binder.

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THE CHEAPEST, PUREST, AND MOST BRILLIANT OF ALL GAS LIGHTS.

**Superior to the Electric Light in Economy, Beauty, & Steadiness.**

SPECIALLY ADAPTED FOR LIGHTING HALLS, FACTORIES, OPEN SPACES, ETC.

Numerous Tests made by various Gas Companies in the United States show an Efficiency of Ten Candle Power per Cubic Foot of Gas.

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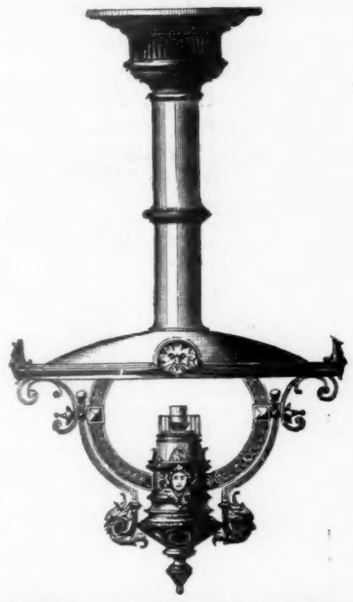

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SOLE MAKERS FOR THE UNITED STATES,

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# THE "STANDARD" WASHER-SCRUBBER,

KIRKHAM, HULETT & CHANDLER'S PATENT.

**Total Capacity per 24 Hours of "Standard" Washers Ordered During the Following Years.**

| | |
|---|---|
| 1877 | 4,000,000 cubic feet. |
| 1878 | 4,750,000 " |
| 1879 | 24,545,000 " |
| 1880 | 42,967,500 " |
| 1881 | 36,462,500 " |
| 1882 | 39,300,000 " |
| 1883 | 57,735,000 " |
| 1884 | 26,177,500 " |
| Total | 235,937,500 cubic feet. |

**Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries**

| | Number. | Cubic Feet per Day. |
|---|---|---|
| Great Britain | 151 | 157,070,000 |
| Western Hemisphere | 38 | 39,337,500 |
| Australia | 18 | 12,150,000 |
| New Zealand | 2 | 650,000 |
| France | 6 | 4,550 000 |
| Belgium | 8 | 5,420 000 |
| Germany | 16 | 8,200,000 |
| Holland | 4 | 4,160,000 |
| Denmark | 1 | 150,000 |
| Russia | 2 | 3,500,000 |
| Spain | 1 | 350,000 |
| India | 1 | 400.000 |
| Total | 248 | 235,937,500 |

**THE CONTINUED POPULARITY**

Of these Machines

Will be recognized from the following extracts from letters from representatives of some of the companies having them in use:

TOLEDO GAS LIGHT AND COKE CO.,
TOLEDO, OHIO, NOV. 25, 1884.

GEO. SHEPARD PAGE, Esq.:

Dear Sir—Replying to your kind favor of 21st inst., I would say that the "Standard" Washer-Scrubber is doing work that is entirely satisfactory to us. During the summer I had 12-oz. liquor; but since cool weather commenced I have been having from 18 to 23-oz. liquor, just as we would elect. There is not a trace of ammonia passing the Scrubber that a test of reddened litmus or yellow turmeric paper would indicate. The machine, in my opinion, is all that could be desired as a means for removing all the ammonia from the gas.

Very respectfully,
C. R. FABEN, Jr.,
Superintendent.

**"Standard" Washers Ordered During the Current Year.**

| | Cu. Ft. per Day |
|---|---|
| Anneberg Gas Co | 200,000 |
| Bombay Gas Co | 400,000 |
| Brussels Co | 1,250,000 |
| Chemnitz Gas Co | 1,000,000 |
| CITIZENS GAS CO., BUFFALO | 750,000 |
| Coke Works in Zabre, Ober-Schlesien | 1,500,000 |
| Cokerei der Friedenshutte, Upper Silesia | 200,000 |
| Dumfries Corporation | 250,000 |
| Dunedin Gas Co., New Zealand | 400,000 |
| King's Lynn Gas Co | 300,000 |
| Leiden, Holland | 600,000 |
| Lincoln Gas Co | 400,000 |
| Liverpool Gas Co | 2,000,000 |
| " " | 3,000,000 |
| LOUISVILLE GAS CO | 1,500,000 |
| Numea Gas Co | 100,000 |
| PITTSBURGH GAS CO | 1,500,000 |
| PORTLAND GAS CO., Oregon | 562,500 |
| SAN FRANCISCO GAS CO | 4,000,000 |
| Sheepbridge | 40,000 |
| ST. LOUIS GAS CO | 2,000,000 |
| Sydney Gas Co | 2,500,000 |
| WASHINGTON, D. C. GAS CO | 2,000,000 |
| Whitchurch Gas Co | 175,000 |
| Total | 26,177,500 |

## GEO. SHEPARD PAGE, No. 69 WALL STREET, NEW YORK,

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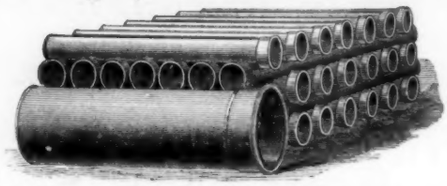

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Estimates and specifications furnished for erection of new works or the extension or alteration of old ones.

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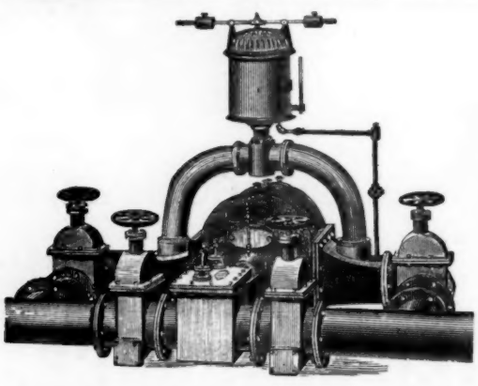

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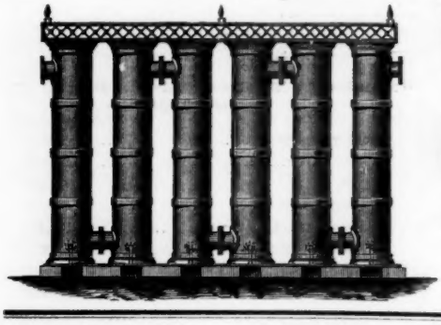

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**Washers, Scrubbers, Condensers, Purifiers,**

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**BENCH CASTINGS**
from benches of one to six Retorts each.
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and everything connected with well regulated Gas Works at low price, and in complete order.

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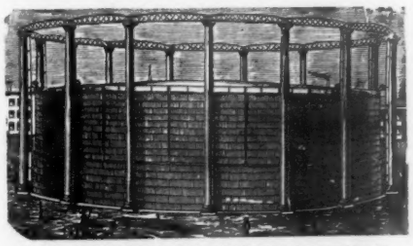

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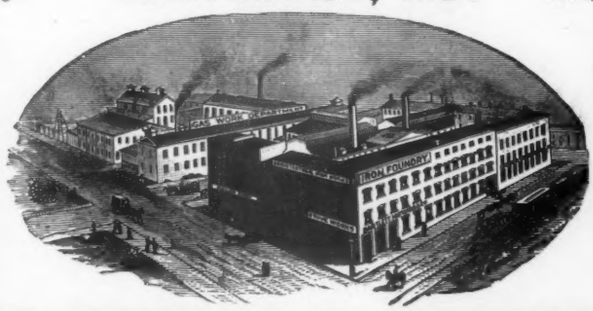


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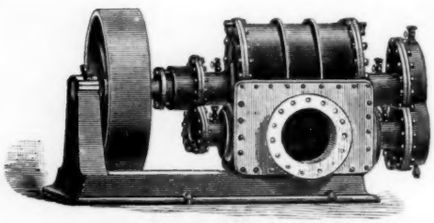

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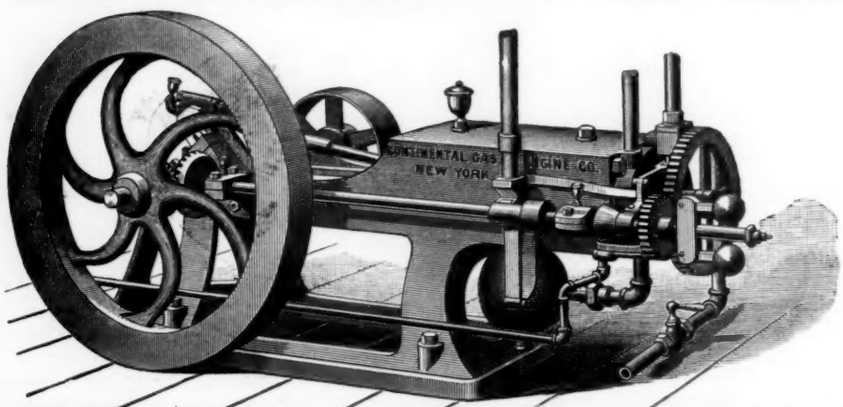


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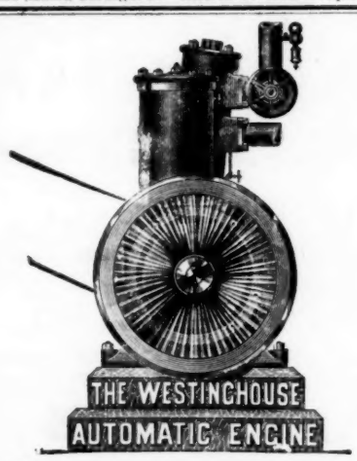


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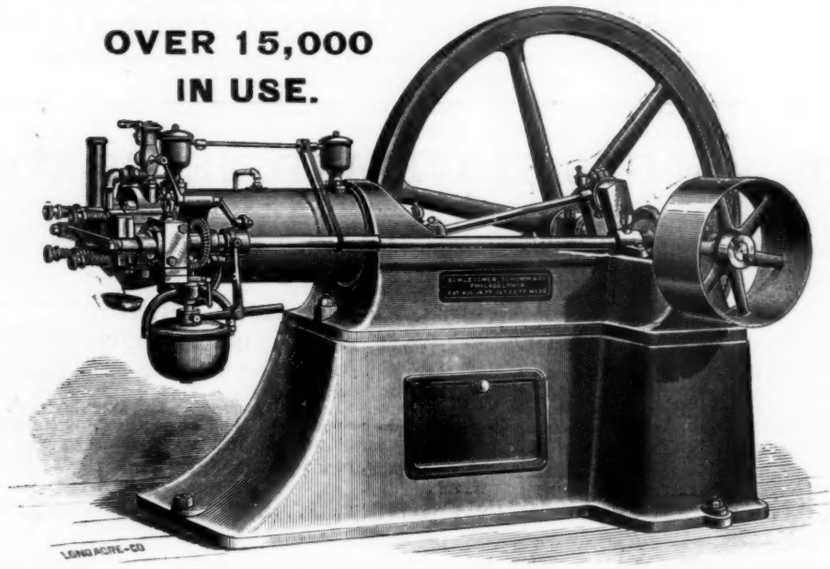

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